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Book

On the determinants of Brazil's manufactured exports : an empir. analysis

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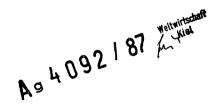Institut für Weltwirtschaft (IfW)

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On the Determinants
of Brazil's Manufactured Exports:
An Empirical Analysis

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Abbreviations and Acronyms

ALADI	Associação Latino-Americana de Integração (Association for Latin American Integration)
BEFIEX	Benefícios Fiscais a Programas Especiais de Exportação (Fiscal Benefits to Special Export Programmes)
CACEX	Carteira de Comércio Exterior (Foreign Trade Department of the Bank of Brazil)
CMS	Constant Market Share
GDP	Gross Domestic Product
ECLA	Economic Commission for Latin America
EEC	European Economic Community
EFTA	European Free Trade Association
FGV	Fundação Getulio Vargas (Getulio Vargas Foundation)
FUNCEX	Fundação Centro de Estudos do Comércio Exterior (Centre for Studies on Foreign Trade)
GATT	General Agreement on Tariffs and Trade
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Geographic and Statistical Institute)
IMF	International Monetary Fund
IPI	Imposto de Produtos Industrializados (Federal Industrial Product Tax)
INPES	Instituto de Planejamento Econômico e Social (Institute for Economic and Social Planning)
IPEA	Instituto de Planejamento Econômico e Social (Institute for Economic and Social Planning of the Planning Secretariat)
ISIC	International Standard of Industrial Classification
LAFTA	Latin American Free Trade Association
NIC	Newly Industrializing Country
RCA	Revealed Comparative Advantage
SITC	Standard International Trade Classification
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organisation

Preface

This study seeks to identify the determinants of Brazil's favourable export performance until the mid-1980s, especially in the field of manufactured goods. Two hypotheses figure prominently in the analysis. The export success may be due to Brazil's specialization in industries which made intensive use of the country's relatively abundant productive factors. Alternatively, economic policies may be responsible for the success in manufactured exports.

While Brazil's overall competitiveness depends on its attractiveness for foreign capital, the performance of specific industries is influenced by various factors, e.g., labour or capital intensity of production, industry-specific government interventions, and firm-characteristics such as public or private ownership and firm-size. It is the major aim of this study to evaluate the relative importance of these factors empirically.

The analysis shows that, in trade with advanced countries, Brazil's export performance was most favourable in labour-intensive products. However, rather capital-intensive industries such as machinery and transport equipment dominated exports to developing countries and also gained importance in trade with industrialized economies. This points to the relevance of policy-induced distortions. Actually, the Brazilian government heavily intervened in the market process to influence the allocation of resources. Import restrictions and export-promoting policies in particular caused an unequal dispersion of incentive schemes among industries. Specific policy-biases were observed with respect to interventions that discriminated against traditional exports and relatively small firms.

The findings suggest that Brazil has not fully exploited the potential benefits from a stronger integration into the world markets. If discriminations against labour-intensive industries were abolished, this would encourage industrial specialization in line with Brazil's relative factor endowments. Similarly, Brazil could make better use of the export potential of small firms if the policy-induced disadvantages were removed. Moreover, a reduction in the privileges granted at the industry of firm level

would put pressure on production costs and could contribute to a more efficient allocation of resources among industries. Such a re-orientation in economic policies would not only further improve export performance, but also accelerate Brazil's overall economic growth.

This study is part of a research project on the present problems and future prospects of the Brazilian economy in the international division of labour. On-going research is concentrating on selected industrial sectors, and is expected to provide us with a more detailed insight into the determinants of export performance. It is also aimed at indicating to what extent Brazil enjoys locational advantages vis-à-vis other countries and will, in the longer run, be attractive for foreign capital.

Kiel, September 1987   Herbert Giersch

I. Introduction

Compared to other industrializing countries, the economic record of Bra-
zil is characterized by outstanding rates of manufactured export expan-
sion and the accumulation of a staggering foreign debt burden. In the
1980s, debt service obligations became untenable, and interventionistic
government policies reinforced rather than mitigated an economic crisis
reflected in declining per-capita incomes and rapidly increasing rates of
inflation. In the short term, the economic welfare of Brazil will substan-
tially depend on improvements in the economic management of the coun-
try. In the medium and long term, the future economic development of
Brazil hinges on her ability to tackle the debt problem by generating
more financial resources internally. A prerequisite for accomplishing this
end is that one must sustain high rates of export growth and, if pos-
sible, exploit the export potential of the country even more rigorously
than in the past. This would also imply a more efficient allocation of
available resources and thus improve overall growth performance (1).

In assessing the future export potential of the Brazilian economy, in
particular with respect to manufactured exports, it is first of all neces-
sary to evaluate the past and present export performance compared to
her likely export potential. This is the focus of the present study. An
attempt is made to analyse the actual export performance since the early
1960s, the sources of international competitiveness of Brazilian manufac-
turing industries and the incentive system established by the govern-
ment, in particular.

Chapter II presents a brief overview of Brazil's industrialization strat-
egies, trade policies and exchange-rate regimes. Chapter III provides an
analysis of internal and external determinants of her export performance.
Since export conditions differ considerably between the Latin American
market and markets in other regions due to preferential trading arrange-

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(1) For the impact of export expansion on economic growth in Brazil see
    Part One of the Appendix.

ments in the former (LAFTA and ALADI) (1), major emphasis is placed on the direction of Brazilian exports and a differentiation of determinants for export expansion in Latin American and other markets. This overview provides the basis for evaluating the interrelations between export performance, international competitiveness, comparative advantage, and economic policy in Chapter IV. Differences between major export markets figure prominently in the analysis, which seeks to explain the commodity composition and direction of Brazil's trade. International competitiveness is empirically indicated by measures of revealed comparative advantage; the analysis of factor intensities prevailing in Brazilian industries provides evidence with respect to the theoretical concept of comparative advantage. Chapter IV provides clues as to whether the international competitiveness of Brazilian manufactured exports was due to comparative advantage in production or to government incentives which were in line or rather in conflict with comparative advantages. These results also shed some light on activities with a promising export potential.

Any analysis of determinants of export performance based on aggregate sectoral data is bound to overlook important features of international competitiveness as they are created and emerge with differing results at the micro level. Therefore, the analysis is supplemented by a closer look at some major differences between exporting and non-exporting firms within individual industries in Chapter V. This is to clarify the relationship between ownership, firm size, factor endowment and discriminatory economic policies on the one hand and export performance on the other. In particular, a micro approach allows an assessment of the role of multinational companies in the Brazilian export development. The micro view presented in this study largely draws on an ECLA survey and only touches the tip of the iceberg.

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(1) The Latin American Free Trade Association (LAFTA) consisted of Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela; the membership did not change with the 1980 transition to the Associação Latino-Americana de Integração (ALADI). Henceforth, the term "ALADI" will also be used for those periods encompassing both the LAFTA and the ALADI phases.

Hence, conclusions drawn in this chapter are of a preliminary nature until more detailed sector studies provide firmer ground for policy recommendations.

Recent policy changes in Brazil and tendencies in world trade are evaluated in Chapter VI. This chapter includes a discussion of the reasons for the export boom in 1983-1985, an evaluation of the impact of recent stabilization policies (Cruzado-Plan) as well as some reflections on the impact of rising protectionism and the new GATT-Round on Brazil's future export prospects. Finally, the main results and conclusions of the study are summarized in Chapter VII.

II. Industrialization Strategy, Trade Policy, and Exchange-Rate Regime

1. The Period before World War II

Brazilian industrialization started in the last decade of the nineteenth century, mainly in the São Paulo area (1). The initiation of this indus-trialization process, fostered by the accumulation of coffee wealth and large-scale European immigration, was rendered viable by tariffs which were already high by world standards [Carvalho, 1985, p. 36]. How-ever, there was no conscious industrialization policy behind this early import-substitution process. Tariffs were raised primarily for revenue purposes and the process was carried out, at least until the 1930s, in a quite liberal environment with a minimum of government intervention (in the case of coffee), general flexibility of prices (including the exchange rate) and the absence of selective controls and incentives (2). Following

Table 1 – Growth of Real Gross National Product and Production of In-dustry and Agriculture in Brazil, 1920-1984 (average annual growth rate in per cent)

Period	Total GNP	Production	
		industry	agriculture
1920-1929	5.3	5.3	4.0
1930-1939	4.5	7.6	2.0
1940-1945	3.1	4.6	1.6
1946-1955	7.5	9.5	4.6
1956-1961	8.0	10.0	4.6
1962-1967	3.7	4.0	2.4
1968-1973	11.1	12.8	4.8
1974-1980	7.1	7.6	5.2
1981-1984	0.1	-1.5	2.5

Source: Simonsen [1986, Table I].

(1) See Baer [1983, Ch. 2] for a detailed analysis of Brazil's early in-dustrial growth.
(2) Nevertheless, government policies during this period, implemented with the intention of controlling trade, supporting coffee prices, and fostering railway development, provided something of a tradition for the later, highly interventionist policies in support of industrial de-velopment.

a period of relatively slow industrial growth during the 1920s, the early 1930s saw the beginning of Brazil's big spurt in industrial growth (Table 1). At the end of the 1930s, most consumer goods subsectors, including garments and footwear, food and beverages, textiles, leather, furniture and wood products, had import ratios below 10 per cent, while the average import ratio was 20 per cent.

2. Industrialization through Import Substitution, 1946-1963

From the late 1940s until the early 1960s Brazil experienced a very sub-stantial process of industrialization through the implementation of an im-port-substitution strategy which was pursued more vigourously with trade and exchange-rate policies, resulting in the heavy protection of domestic industrial activities [Donges, Müller-Ohlsen, 1978, p. 15]. In addition, substantial credit subsidies, resulting from low nominal interest rates and considerable inflation, were awarded to privileged industries. From 1945 to 1962, industrial production increased by an average rate of 8 per cent per annum, fueled by large inflows of direct investment (par-ticularly from 1956 to 1961) and public sector investment in manufactur-ing. The rapid growth, especially in the 1950s, was accompanied by in-creasing balance-of-payment pressures, due to a large extent to the pol-icy-induced discrimination of exports (1). This foreign-exchange con-straint was only delayed, but not eliminated, by the inflow of foreign investment and by increasing foreign borrowing. External debt increased from less than 50 per cent of annual exports (1947/48) to more than double the annual exports by 1962-1966. During this period, total com-modity exports increased by only 1.3 per cent per annum and manufac-tured exports (excluding food) were less than 5 per cent of total ex-ports by 1964. The inward-oriented development of the 1950s and 1960s

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(1) In addition, the enhanced import substitution did not lead to a sig-nificant reduction in imports; on the contrary, imports of intermedi-ate inputs and capital goods had to be increased to sustain economic growth.

thus resulted in a high level of external indebtedness and heavy debt-service obligations, while the economy depended on a very small foreign sector.

In the early 1960s, inflation accelerated and contributed to an aggravation of balance-of-payments and socio-economic problems. Since international credit was harder to obtain [Baer, 1983, p. 119], the shortage of foreign exchange became a major bottleneck to economic development and the growth rate of GDP declined drastically from 10.2 per cent (1961) to 5.3 per cent and 0.8 per cent in the following years. All of these economic difficulties contributed to the military coup in 1964 and to a subsequent reorientation of economic policies.

3. Towards Opening the Economy, 1964-1973

The economic policies applied between 1964 and 1967 were directed to correct the internal and external disequilibria that had developed during the previous years. The stabilization programme contained both fiscal and monetary restraints. Exchange-rate policy was made more conducive to exporters, not so much by increasing the real exchange rate as by, in 1968, committing the government to a devaluation policy based on an implicit underlying purchasing-power-parity formula realized by frequent mini-devaluations. The period also witnessed a cautious opening up of the economy with emphasis on the promotion of exports [Savasini, 1978, p. 9]. Tariffs were reduced early in 1967 by about 50 per cent and the government instituted generous fiscal incentives, which involved both tariff exemptions and subsidies for manufactured exports. At the end of the 1960s, the new policy reform was finally completed [Balassa, 1979, pp. 1024-1025]. Export incentives, coupled with some modest and lasting import liberalization, did much to reduce the anti-export bias inherent in Brazilian economic policies. As a result, Brazil experienced what was sometimes later called an "economic miracle": During the 1968-1973 period, exports and GDP grew at an annual rate of 14.3 per cent and 11.1 per cent in real terms. After 1967, this very rapid growth was mainly

spurred on by expansionary fiscal and monetary policies, the existence of a high degree of unutilized capacity in the manufacturing sector, and a favourable international environment.

4. The Oil Crises and the Return to Import Substitution, 1974-1979

The 1973 oil price shock led to events which, in the mid-1970s, culminated in a reversal of the cautious tendency to open up the economy. There were several significant policy changes which indicated a return to an active import-substituting policy in the 1970s, such as the departure from the purchasing power parity and the subsequent overvaluation of the currency. In addition, the tendency to liberalize import restrictions was abruptly reversed. In order to cope with the severe balance-of-payments problems (1), tariffs were increased by 100 percentage points for 1,200 items and by 30 percentage points for another 800 items, increasing quantitative restrictions as well as introducing a 100 per cent, one-year deposit to be held for nearly one third of all imports [Balassa, 1979, pp. 1030-1032]. Finally, large investments in paper products, petrochemicals, fertilizers, steel and non-ferrous metals were envisaged in the Second National Development Plan (1975-1979) which aimed at approaching self-sufficiency in these products by the end of the decade. Domestic production subsidies, extended through credit and fiscal mechanism, were rather lavishly provided to import-substitution projects, especially for capital and intermediate products. Although on the export side, the promotion programme of the previous period remained basically unchanged [World Bank, a, p. 45], the anti-export bias in economic policies increased considerably.

Obviously, these measures were not adequate to achieve an export performance as in the previous period: the growth of exports declined drastically during the 1973-1978 period to an average annual rate of 6.0 per

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(1) The higher oil prices caused a drastic deterioration of the trade balance, moving from a surplus of US $6.2 billion in 1973 to a deficit of US $4.8 billion and US $3.6 billion in 1974 and 1975 respectively (Table A2).

cent (Table A2). The rate of growth of GDP, however, remained at a relatively high level (7.1 per cent on average). Higher investments in the import-substituting activities already mentioned, and also in infra-structural facilities, raised the average investment ratio from 24.0 per cent in the 1966-1973 period to 28.4 per cent from 1974 to 1978. Its financing was, however, at the "expense" of increasing inflation and foreign indebtedness. The latter rose from US $19.1 billion at the end of 1974 – thus including already the increase of foreign debt due to higher oil prices – to US $46.2 billion in 1978.

5. The Balance-of-Payments Constraint since 1979

At the beginning of 1979, a policy programme was adopted intended to initiate steps to liberalize the economy again. However, this programme did not survive the impact of the second oil price increase, and economic policy pursued a "stop and go" approach. The measures used to cope with the external imbalance and high domestic inflation were: a maxi-de-valuation of the cruzeiro vis-à-vis the US dollar in December 1979; the removal of the prior deposit scheme on imports; a one-step elimination of fiscal subsidies to exports; as well as the introduction of export taxes on major export commodities. Despite a remarkable growth of exports in the following year, 1980 ended with another trade deficit of US $2.9 billion.

Early in 1981, the scheme of frequent mini-devaluations at rates equal to the increase in consumer prices as well as fiscal subsidies on exports were re-introduced to stimulate exports, while an attempt was made to dampen import growth by the introduction of a surcharge tax of 25 per cent and the intensification of import controls. As a result of these measures and the reduction in domestic absorption, it was possible to achieve a trade surplus of US $1.2 billion in 1981. However, GDP declined by 1.6 per cent and foreign indebtedness increased by another US $18.1 billion, reaching a total of US $64.3 billion. Finally, in 1982, problems on the external position accumulated as exports fell by US $3.2 billion (pushing the debt-service ratio up to nearly 71 per cent), net

international reserves turned negative [Bacha, 1983, p. 31] and new loans from commercial banks were refused.

At the end of 1982, Brazil was close to declaring its international insolvency. After Mexico stopped repaying its external debt in the autumn of that year, the commercial banks' confidence in Brazil's creditworthiness also declined rapidly. Within not quite a decade, the country's external debt increased from US $12.7 billion in 1973 to US $70.7 billion in 1982, while debt services, which amounted to 42.3 per cent of total export earnings in 1975, rose to 70.8 per cent in 1982 (1). In December 1982, the Brazilian government had to start negotiations with the IMF. From then on, several letters of understanding were signed but the underlying policy targets were not achieved except for the trade balance objective. Thereafter, Brazil became increasingly reluctant to accept the well-known IMF cure and tried to achieve a rescheduling of its debt through direct negotiations with the commercial banks.

This reluctance is closely related to Brazil's success in achieving substantial surpluses in the trade balance over the last few years (US $6.5 billion in 1983, 13.1 billion in 1984, and 12.5 billion in 1985) which has enabled her to pay at least the interest on its outstanding external debt. However, these surpluses were to a large extent the result of sharp reductions in imports (-20.5 per cent in 1983, -9.8 per cent in 1984, and -5.2 per cent in 1985). Exports increased by 8.6 per cent and 23.3 per cent in 1983 and 1984 and declined by 5.1 per cent in 1985.

Maintenance of high export growth rates is, however, essential to restore the country's creditworthiness in international capital markets and thus also to improve its long-term growth prospects. In order to assess the prospects for further export growth, the following chapter analyses internal and external determinants of the export performance of the Brazilian economy over the past two decades.

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(1) Data refer to debt with a maturity of more than one year [World Bank, c].

III. The Development of Brazilian Exports, 1965-1982

1. Overall Export Performance (1)

In the 1965-1982 period, Brazil's total exports grew in real terms at an
average annual rate of 9.3 per cent (2). This average, however, masks
the fact that, up to the first oil price shock, export growth was three
times higher than in the following sub-period (1973-1982). Growth of
primary commodities was just one fifth of that in the period before and,
consequently, the commodity composition of exports also changed drastic-
ally over time (Table 2):

- The share of primary commodities in total exports declined continuously
  from 94.3 per cent (1965) to 65.5 per cent (1982). The country's for-
  mer dependence on coffee exports as the major source of foreign ex-
  change earnings also decreased substantially. While coffee in 1965 ac-
  counted for 44.3 per cent of total exports, its share fell to one tenth
  in 1982. New products such as soy-beans and their derivatives as well
  as petroleum and petroleum products became major export items among
  primary commodities.

- Manufactured exports (3) as a share in total exports rose from 5.0 per
  cent in 1965 to one third in 1982. Machinery and transport equipment

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(1) This section, which draws heavily on Dippl [1986, pp. 6 ff.], has to
    be largely confined to the 1965-1982 period since, for subsequent
    years, similarly disaggregated information on Brazilian manufactured
    exports is not available from Commodity Trade Statistics (for some
    more general indications of Brazil's export performance in the most
    recent past, see Ch. VI.1).
(2) In the following, we mainly refer to UN [a] as the principal source
    for Brazilian manufactured export performance because other sources
    do not provide a sufficiently disaggregated picture, both in terms of
    commodity composition and direction of trade. A disaggregated analy-
    sis is required since export conditions can be supposed to differ
    considerably between different export items and different markets.
    Current US dollar export values were deflated by the US wholesale
    price index as published in IMF [b]; for a discussion on the sensi-
    tivity of real export growth rate calculations to the choice of def-
    lators, see footnote (1) on page 16.
(3) Manufactured exports are reported in the Standard International
    Trade Classification (SITC) and include the following SITC catego-
    ries: 5 (chemicals), 6 (basic manufactures, excluding categories 67

Table 2 - Structure of Brazil's Exports, 1965-1982 (per cent)

Commodity group	Share in total exports				
	1965	1970	1975	1980	1982
Primary commodities	94.3	89.5	74.6	65.9	65.4
Food items (SITC 0+1+22+4) (Coffee)	67.3 (44.3)	63.3 (35.9)	54.1 (10.8)	46.3 (13.8)	39.6 (10.6)
Agricultural raw materials (SITC 2-22-27-28)	15.2	11.9	3.9	4.0	3.2
Crude fertilizers and metallic-ferrous ores (SITC 27+28)	9.0	9.9	12.0	8.9	10.0
Fuels (SITC 3)	0.0	0.6	2.3	1.8	7.2
Iron and steel and non-ferrous metals (SITC 67+68)	2.8	3.8	2.3	4.9	5.5
Manufactured goods (SITC 5+6-67-68+7+8)	5.0	9.7	23.2	32.9	33.3
Chemical products (SITC 5)	0.9	1.4	2.1	3.6	4.5
Basic manufactures (SITC 6-67-68)	2.1	3.9	6.3	8.1	7.0
Machinery and transport equipment (SITC 7)	1.8	3.6	10.3	16.9	17.2
Miscellaneous manufactured articles (SITC 8)	0.2	0.8	4.5	4.3	4.6
Unallocated	0.7	0.9	2.1	1.2	1.2
Total	100.0	100.0	100.0	100.0	100.0

Source: UNCTAD [various issues]; UN [a]; own calculations.

became the most important export items, accounting for more than half of exports in manufactures in 1982. Measured against total exports,

and 68), 7 (mechanical and transport equipment), and 8 (miscellaneous manufactured goods).

Table 3 - Brazil's Share in World Trade, 1965-1982 (per cent)

	1965	1970	1973	1975	1979	1980	1982
Share in							
total world exports	0.83	0.87	1.08	0.99	0.93	1.01	1.09
total exports from LDCs	4.24	4.98	5.65	4.11	3.68	3.60	4.15
world exports of manu-factured goods(a)	0.09	0.15	0.35	0.45	0.57	0.65	0.69
exports of manufactured goods from LDCs	2.03	2.96	4.99	6.67	6.34	6.91	6.33
(a) Defined as SITC 5+6-67-68+7+8.							

Source: UN [a; c]; own calculations.

their share increased drastically from 1.8 per cent in 1965 to 17.2 per cent in 1982.

The Brazilian export performance after the mid-1960s was good, not only in absolute terms, but also relative to world export growth (1965-1982: 16.1 per cent in Brazil as against 14.2 per cent for world exports, in nominal terms). Consequently, Brazil's share in world exports increased from 0.8 in 1965 to 1.1 per cent in 1982 (Table 3). Its weight in Third World exports increased considerably up to 1973; the decline thereafter was largely due to the impact of the oil price hikes on these countries' total exports. Compared with total exports, the performance in manufactured exports was much better. Brazil's share in world manufactured exports rose continuously from almost nil in 1965 to 0.7 per cent in 1982 and it is now one of the major exporters of manufactures from the developing countries.

Brazil still had a rather closed economy at the beginning of the 1980s compared with some other newly industrializing countries (Table 4). The progress it made in integrating into the world economy was slow if measured by the change in the share of exports in GDP since the mid-1960s. This becomes especially evident if the country is compared with South

Table 4 – Export/GDP Ratios of Some Newly Industrializing Countries and
their Change between 1965 and 1981 (a)

	Export ratio in 1981	Change in percentage points since 1965
Brazil	8.4	1.9 (b)
Mexico	14.0	4.7
Spain	17.0	6.0
Greece	19.7	10.1
Thailand	24.8	6.1
Portugal	27.5	2.8
South Korea	34.8	29.0
Taiwan	53.1	33.7
Malaysia	55.0	8.3
(a) Ratios (exports as a per cent of GDP) are three-year averages for 1964-1966 and 1980-1982 respectively. – (b) Based on the average of 1965-1967.		

Source: IMF [b]; CEPD [various issues]; World Bank [b]; own calcula-
tions.

Korea, where the shift in policy from import substitution to a more out-
ward-looking strategy after the early 1960s was much more pronounced.
In 1965, Brazil's export ratio was higher than that of South Korea,
namely 6.5 per cent compared to 5.8 per cent (1), but this was no lon-
ger the case in 1981.

2. Export Performance by Goods and Regions

In the 1965-1982 period, not only the relative importance of primary and
manufactured goods in Brazil's exports changed considerably but also the

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(1) Another comparison shows that, in 1982, South Korea's foreign debt
as a percentage of GDP even exceeded that of Brazil (32.6 and 25.2
per cent, respectively); however, South Korea had no problems in
obtaining external finance. Its debt-service payments amounted to
14.3 per cent of total exports in 1982, while, in the case of Brazil,
this ratio was 70.8 per cent.

geographical distribution of her world market sales (Table 5). As re-
gards total exports, one of the most striking developments was the dras-
tic decline in the role of the United States as one of Brazil's major
export markets. Between 1965 and 1975, the share of the country's ex-
ports to the US halved to 15.4 per cent and in 1982 it was still 11 per-
centage points lower than in 1965. Throughout the period investigated,
the EEC proved to be the largest market for Brazilian exports. The
share of exports destined to this area rose to 37.3 per cent up to the
first oil price shock. Thereafter, it fell to 27.0 per cent and has stag-
nated at about the same level for some time. Furthermore, the share of
exports to the other European countries more than halved between 1970
and 1982. As far as trade with the industrialized countries is concerned,
only exports to Japan increased markedly. In total, the share of exports
to the industrialized countries decreased from 1965 by 17.4 percentage
points to 61.4 per cent in 1982.

Accordingly, Brazil's trade with other developing countries became much
more intensive. Exports to these areas nearly doubled from 15.3 per cent
in 1965 to 29.2 per cent in 1982. Traditionally, the largest share of
these exports was destined to the ALADI member countries. Exports to
other developing nations in the Middle East, Asia and Africa increased
by 6 percentage points after 1965, accounting for 8.5 per cent of total
exports in 1982. After 1980, exports to the ALADI declined. A major
reason for this shift in Brazil's South-South exports was the increase in
the purchasing power of the oil-exporting developing countries.

When differentiating between manufactured and primary commodities,
some interesting trends can be observed with respect to the destination
of exports. Exports of primary commodities to industrialized countries
showed a declining trend while the share of these products sold to de-
veloping countries rose from 13.6 per cent in 1965 to 23.8 per cent in
1982 (Table A3). Exports of primary commodities to the ALADI members
decreased by 3.4 percentage points after 1965, which corresponds to a
decline of nearly 50 percentage points if measured against primary ex-
ports to the Third World.

Table 5 - Direction of Brazil's Total Exports, 1965-1982 (per cent)

Destination country(a)	1965	1970	1975	1980	1982
US	31.2	24.7	15.4	17.4	20.5
Japan	1.9	5.3	7.7	6.1	6.5
EEC	32.7	35.4	28.0	27.2	26.9
Other European countries(b)	9.4	11.0	9.4	7.0	5.1
Other industrialized countries(c)	3.6	2.2	2.3	2.3	2.4
ALADI(d)	12.6	11.1	13.8	17.2	14.1
Oil-exporting LDCs(e)	0.3	0.9	6.4	6.1	6.6
Middle East	0.5	0.6	1.8	1.6	1.5
Asia(f)	1.1	2.9	1.3	3.1	3.3
Africa	0.8	0.6	1.2	2.9	3.7
Centrally-planned economies(g)	5.6	4.6	9.7	6.9	6.2
Others	0.3	0.7	3.0	2.2	3.2
Total	100.0	100.0	100.0	100.0	100.0

(a) Definitions of country groups as in the source, when not otherwise indicated in the following. - (b) Other European countries include "Europe" as in the source plus Austria, Finland, Iceland, Norway, Spain, Sweden and Switzerland. - (c) Canada, Australia, New Zealand and South Africa. - (d) Members are Argentina, Bolivia, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela and Brazil. - (e) Venezuela not included. - (f) People's Republic of China not included. - (g) Includes People's Republic of China, Hungary and Rumania.

Source: IMF [a]; own calculations.

Brazil's manufactured exports, which started from an extremely low level, have grown rapidly and in a stable fashion since the early 1960s (1). While these exports amounted to only US $36 million in 1963, they reached over US $10 billion in 1984. In real terms, the average annual

(1) Several studies have been undertaken on Brazilian manufactured exports; see among others, von Doellinger, Dupas [1971], Tyler [1976; 1983], Rosa [1978], and Pinto [1980]. Most of these studies cover the 1960s and early 1970s, a World Bank report [a] covers the 1970s and Cardoso [1982] presents an analysis of Brazil's foreign trade over the last century.

growth rate of Brazilian manufactured exports was 22 per cent for the 1963-1984 period. Over the same period, world exports in manufactured goods grew at an average annual rate of about 7 per cent, and manufactured exports of South and South-East Asian countries at about 15 per cent (for more detailed information, see Table 6) (1). The manufactured export performance of Brazil was not only impressive in the period of favourable world trade conditions (1963-1973) but also for the subsequent years of depressed world demand. Notwithstanding the markedly slower growth of Brazilian manufactured exports after 1973, she still outperformed the world and even the very successful East and South-East Asian exporters.

Brazil's remarkable manufactured export performance has been accompanied by significant changes in the product composition of manufactured exports as well as in the direction of trade. After 1973, growth of world market sales was most impressive for such non-traditional export items as plastics (44 per cent per annum in nominal terms) (2), transport equipment (40 per cent), non-electrical machinery (30 per cent), and paper and paper products (30 per cent; see Table A4). On the other hand, more traditional export products in the basic manufactures category (e.g., leather, textiles, non-metallic mineral manufactures) as well as footwear and electrical machinery, which headed export growth in 1963-1973, fell considerably behind thereafter. As a result, the structure of Brazil's manufactured exports became similar to the pattern of world

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(1) The calculation of real export growth is sensitive to the price index chosen to deflate nominal exports. Using the US wholesale price index as a deflator, Dippl [1986, Table 1] computes the real growth rates of 34.6 per cent for 1965-1973 and 13 per cent for 1973-1982. In comparing Brazilian export growth rates with those of other countries or country groups, distortions arise due to differences in the deflators that had to be applied (see note to Table 6). For example, real growth in manufactured exports of other developing countries is understated in periods of raw material price booms since the index of overall export unit values had to be used. Notwithstanding such distortions, Brazil's export performance relative to other country groups remains impressive. It seems safe to assume that Brazil has outperformed world export growth, considering the remarkable differences in the growth rates shown in Table 6.

(2) Real growth rates for individual SITC categories cannot be calculated since information on adequate price deflators is not available (for details, see Table A4).

Table 6 - Real Growth of Manufactured Exports (a) of Brazil and Other
Regions to Selected Destinations, 1963-1984 (average annual
rate in per cent)

	1963–1967	1968–1973	1974–1978	1979–1981	1982–1984 (b)	1963–1973	1974–1984 (c)
Brazil	23.0	30.0	17.9	21.4	13.3	26.8	17.6
US	23.3	27.9	18.1	10.1	n.a.	25.8	15.0
ALADI	27.1	20.7	22.4	32.6	n.a.	23.6	26.1
EEC + EFTA	18.3	33.2	12.2	16.0	n.a.	26.2	13.6
RofW (d)	28.5	50.7	19.2	21.7	n.a.	40.1	20.1
World (e)	9.5	11.3	5.8	3.9	4.4	10.5	5.1
US	15.2	12.3	6.3	4.5	n.a.	13.3	5.2
ALADI	0.3	7.5	7.2	12.2	n.a.	4.1	8.9
EEC + EFTA	10.5	13.7	5.1	1.2	n.a.	12.2	3.5
RofW (d)	8.9	9.5	6.8	5.7	n.a.	8.7	6.3
Developing countries (e)	12.3	17.5	10.1	11.7	10.0	15.1	10.6
South and South-East-Asian countries	12.5	21.2	12.2	13.2	10.3	17.2	12.1

(a) Manufactured goods correspond to SITC: 5+6-(67+68)+7+8. World ex-
ports of manufactured goods were deflated by export unit values of in-
dustrial countries, Brazilian manufactured exports by an index of manu-
factured export prices published by the FGV, developing countries manu-
factured exports by the export unit value of non-oil developing coun-
tries, and South and South-East Asian countries manufactured exports by
the export unit value of Asia. - (b) Only until 1983 for developing
countries and South and South-East Asian countries. - (c) Only up to
1981 for Brazil and the world's exports to the US, ALADI, EEC + EFTA,
and the rest of the world. - (d) RofW = Rest of world. - (e) Excluding
Brazilian exports.

Source: UN [a]; IMF [b]; own calculations.

exports, while in 1973 it was very close to the export structure of the
group of developing countries (Table A5). The evidence indicates that
the composition of Brazil's manufactured exports has moved away from
that of other successful exporting nations in the Third World, such as
countries in Asia, and now resembles more the export bundle of an in-
dustrialized country. This impression is confirmed - at least at first
glance - by factor intensities embodied in different export items. The

emerging top export products are manufactured in relatively capital-intensive industries while growth of many labour-intensive export categories has slowed down considerably (1).

An important factor for the changing role of different export items and the rising share of rather capital-intensive goods after 1973 becomes obvious when looking at changes in the direction of Brazilian manufactured exports. With respect to both total manufactured exports and exports of the individual SITC groups 5-8, developed countries (mainly US and EEC) and ALADI were by far the most important markets for Brazil accounting for more than 80 per cent of all exports (Table A7). This holds true even though the share of developing countries outside the ALADI region in total Brazilian manufactured exports increased by more than 10 percentage points from 5 to 16 per cent between the early 1960s and the early 1980s. However, the relative importance of the two major regional markets for Brazilian manufactured exports varied considerably over time. In 1973, developed countries accounted for nearly two thirds of total manufactured exports, whereas the share of ALADI had fallen to less than a quarter. Later on, the share of developed countries dropped to 52 per cent (1978) and 44 per cent (1981) and ALADI gained significantly in importance (30 and 39 per cent respectively). These shifts are also reflected in real growth rates of Brazilian manufactured exports to different regions (Table 6). Comparing 1963-1973 and 1974-1981, real growth rates were nearly halved for exports to US and EEC+EFTA, mainly due to demand factors, whereas export growth to ALADI even increased after 1973 (2).

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(1) Ranking Brazilian industries according to capital investment per employee, all four non-traditional industries except non-electrical machinery (on average, SITC 71 ranges in the middle) figure prominently in the top group of relatively capital-intensive industries (Table A6).

(2) Figures on world exports to different regions (also presented in Table 6) point to the dominant role of demand factors in explaining these remarkable differences. It is evident that the growth in total ALADI imports increased after 1973 whereas overall exports to developed countries slowed down drastically due to depressed trade conditions in industrialized countries.

The increasing share of ALADI markets in Brazilian manufactured exports after 1973 is most relevant to an understanding of the changes in commodity composition, since the bundle of products delivered to ALADI markets and markets of developed economies was distinctly different (see Table 7, and, for further details, Nunnenkamp and Fasano-Filho [1986, Table A6]):

- In the late 1960s and early 1970s, nearly half of Brazilian manufactured exports to developed countries fell into the basic manufactures category (SITC 6). In subsequent years, the share of products belonging to this category dropped to 30 and 23 per cent. Brazilian exports to developed countries became more diversified, as indicated by the Gini coefficient which can be used as a measure of export concentration (Table A8), and two new types of exports gained in importance. Firstly, labour-intensive products of SITC 8 jumped from practically nil in 1968 to more than 20 per cent in the early 1980s, mainly due to exports of footwear. As a result, rather labour-intensive products of SITC categories 6 and 8 continued to account for a significant share in Brazil's exports to developed economies in the 1970s and early 1980s. Secondly, the shares of non-electrical machinery and transport equipment increased remarkably after 1973. It has to be borne in mind, however, that in 1973 the shares of these items were considerably lower than in the 1960s. The rapid export expansion in these categories nevertheless suggests a substantial degree of international competitiveness.

- Brazil's manufactured exports to ALADI reveal a completely different pattern. Apart from in 1968, basic manufactures merely accounted for about 20 per cent. The miscellaneous products of SITC category 8 were even less relevant. Exports to ALADI were dominated by machinery and transport equipment (1). The share of SITC 7 which amounted to 53-55 per cent in the late 1960s and early 1970s further increased to 62-63 per cent later on. Looking at the regional distribution of Brazilian exports of SITC 7 (Table A7), the dominant role of ALADI is confirmed. Moreover, the shares lost by ALADI in the 1970s accrued to

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(1) Consequently, the concentration in Brazilian manufactured exports to ALADI (measured by the Gini coefficient in Table A8) exceeded the corresponding figures for exports to developed countries.

Table 7 - Commodity Composition of Brazilian Manufactured Exports to Developed Countries and ALADI (a), 1962-1981 (per cent)

SITC Industry	1962	1968	1973	1978	1981
	developed countries				
5 Chemicals	56	32	10	8	15
6 Basic manufactures	26	45	46	30	23
65 Textiles	(4)	(9)	(23)	(13)	(11)
7 Machinery and transport					
equipment	16	19	17	39	40
71 Non-electr. machinery	(1)	(13)	(7)	(19)	(19)
72 Electr. machinery	(-)	(1)	(8)	(12)	(7)
73 Transport equipment	(14)	(5)	(2)	(8)	(14)
8 Misc. manufactures	2	4	27	23	21
84 Clothing	(-)	(1)	(8)	(4)	(2)
85 Footwear	(-)	(-)	(13)	(14)	(15)
	ALADI				
5 Chemicals	9	7	10	9	10
6 Basic manufactures	17	37	22	20	18
65 Textiles	(3)	(17)	(9)	(6)	(4)
7 Machinery and transport					
equipment	72	53	55	62	63
71 Non-electr. machinery	(11)	(40)	(27)	(31)	(26)
72 Electr. machinery	(1)	(11)	(11)	(9)	(10)
73 Transport equipment	(49)	(1)	(18)	(23)	(27)
8 Misc. manufactures	3	3	13	10	10
84 Clothing	(-)	(-)	(7)	(3)	(1)
85 Footwear	(-)	(-)	(-)	(-)	(1)

(a) The relation between the "Nomenclatura Brasileira de Mercadorias" and SITC was taken from Silber [1983, App.2]. Figures in parentheses for 2-digit SITC categories.

Source: UN [a]; Banco Central do Brasil [various issues]; own calculations.

other developing countries rather than to developed economies. Consequently, the Third World accounted for 60-67 per cent of total Brazilian world market sales of machinery and transport equipment over the whole period under consideration. This underlines the importance of the Third World, and the Latin American market in particular, for relatively capital-intensive Brazilian exports.

The analysis shows that export-market diversification coupled with product diversification have characterized Brazil's manufactured export performance since the early 1960s. However, the potential for further diversification does not seem to be exhausted. There is still plenty of room for further export market diversification as suggested by the continuous dominance of US and ALADI markets. The same applies to product differentiation: out of the fifteen most important export items in 1981, ten still belonged to the non-manufactures category accounting for nearly half of total Brazilian exports. Both the search for new markets and new products could exhaust Brazil's export potential and thus help to reduce the burden of servicing foreign debt and stimulate overall economic growth.

3. The Relevance of Demand for Export Expansion

Reference has been made to demand influencing Brazil's export expansion. Since world demand for manufactured goods cannot be influenced by the Brazilian government or by her exporters, the relevance of demand for the direction and volume of exports has to be analysed.

The influence of demand on the export performance can be separated by constant market share (CMS) analysis. CMS analysis is based on the following identity:

$$(\sum_i \sum_j X_{ij}^1 - \sum_i \sum_j X_{ij}^0) - \sum_i \sum_j r X_{ij}^0 = \sum_i \sum_j (r_i - r) X_{ij}^0$$
$$+ \sum_i \sum_j (r_{ij} - r_i) X_{ij}^0$$
$$+ \sum_i \sum_j (X_{ij}^1 - X_{ij}^0 - r_{ij} X_{ij}^0)$$

where: X_{ij}^1 = value of exports of commodity i to region j in the end-year 1 of the period investigated;

X_{ij}^0 = value of exports of commodity i to region j in the base-year 0 of the period investigated;

r = growth rate of total world exports;

r_i = growth rate of world exports of commodity i;

r_{ij} = growth rate of world exports of commodity i to region j (without the country investigated).

Export growth is split up into a world-trade effect (i.e., the increase necessary to keep the country's share in world exports constant), a commodity-composition effect, a regional-market-concentration effect, and a residual. While the former effects represent demand factors, the residual is generally said to capture supply-side effects on international competitiveness (1).

The CMS analysis was applied by Dippl [1986, pp. 13 ff.] to the increase in Brazil's total exports in the two sub-periods 1965-1973 and 1973-1981, differentiating between eight commodity groups and fourteen regions. His results show that Brazil's export performance was facilitated by the general increase in world demand. However, in both sub-periods, the commodity composition of the country's total exports proved to be a serious hindrance to a higher export growth. This negative influence was especially visible in the 1973-1981 period and it indicates that there were many commodities which faced a growth in demand which was much slower than on world average. The market effect shows that exports were mainly directed to regions where demand was growing at roughly the same rate as on world average. The increase in Brazil's world market share during both sub-periods is thus due to supply-side factors. The favourable influence of these factors, however, diminished somewhat after the first oil price shock.

Our results of the CMS analysis for Brazilian manufactured exports in different sub-periods are presented in Table 8. In contrast to earlier studies [see, e.g., Horta, 1983; Rosa, 1978; Dippl, 1986], our analysis

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(1) The CMS approach has frequently been criticized with respect to conceptual limitations and problems in empirical application [see, e.g., Bowen, Pelzman, 1984, p. 461; Leamer, Stern, 1970]. The residual reflects the interaction of both demand and supply factors, rather than supply factors exclusively. Moreover, CMS results are quite sensitive to changes in the base-year, level of commodity aggregation, and definition of world market.

Table 8 - Constant Market Share Analysis of Brazilian Manufactured Exports to Different Markets in Different Sub-Periods, 1962-1981 (a)

Period	World	Developed countries	Developing countries	ALADI	Centrally -planned economies
world-trade effect					
1962-1967	24	31	17	17	26
1968-1973	17	13	27	35	11
1974-1978	50	67	36	n.a.	52
1979-1981	31	46	24	23	12
commodity effect					
1962-1967	9	11	6	6	9
1968-1973	1	1	2	2	1
1974-1978	19	25	13	n.a.	20
1979-1981	-5	-7	-4	-4	-2
market effect					
1962-1967	-2	7	-8	-22	-5
1968-1973	-2	1	4	-11	-3
1974-1978	5	-10	21	n.a.	-10
1979-1981	20	-18	30	37	-5
supply-side effect					
1962-1967	69	50	85	99	70
1968-1973	84	85	67	74	91
1974-1978	27	18	30	n.a.	38
1979-1981	54	79	50	44	94

(a) World trade, commodity, market and supply-side effects as a per cent of actual growth of manufactured exports.

Source: UN [a]; own calculations.

covers a longer time period and presents separate calculations for Brazil's major export markets. However, the principal conclusion remains the same as that of earlier studies. The results in Table 8 point to supply-side effects as the major source of growth in Brazil's manufactured exports. This applies to all export markets and all sub-periods investigated, except for 1974-1978 when demand (world-trade effect) dominated and the re-implementation of import-substitution policies in Brazil might have negatively affected its international competitiveness.

These findings provide sufficient grounds for concentrating on the subsequent analysis of supply factors despite the limitations of the CMS approach mentioned above.

4. Brazil's Manufactured Export Supply: Some Hypotheses

Brazil's manufacturing industries may achieve international competitiveness because they enjoy a comparative advantage in the production of certain products resulting from her resource endowment; similarities of consumer preferences in Brazil and in other (developing) countries open up markets for Brazilian exporters; or special trading arrangements and other government interventions provide an artificial competitive edge to those domestic industries not necessarily possessing a comparative advantage in production. From what has already been said, it is also evident that different export conditions prevailing in the ALADI region, other developing countries and developed countries must be taken into account in determining the roots of international competitiveness of different manufacturing industries.

According to the standard Heckscher-Ohlin theory of international trade, a country should supply products that use the abundant factors of production intensively. In the case of Brazil, there still is a large untapped labour supply outside the formal labour markets which would suggest a comparative advantage in labour-intensive exports. However, for two different reasons, there may also be a justification for more capital-intensive exports to developed economies. New products going through a product cycle finally become well established in markets and standardized in production. At this stage, human capital requirements become low and, notwithstanding a relatively high physical capital intensity, more advanced developing countries can be supposed to have comparative advantages in producing such standardized export items. Physical capital should be much less of a bottleneck than human skills, due to its international mobility [Wolter, 1975]. Policy interventions provide the second possible reason for capital-intensive exports. Economic policies have often discriminated against labour-intensive activities in many developing

countries and hence have favoured a production and export structure more capital-intensive than would have been adequate given the countries' factor endowment. This argument may also be of some relevance in the case of Brazil. Savasini [1978] concluded that the export-promotion policy implemented since the mid-1960s has given priority to the sectors that absorbed relatively little labour per unit of final demand.

As regards exports to developing countries, similarities in consumer preferences may also give rise to Brazil's competitiveness vis-à-vis exporters located in developed economies: Brazilian exporters can be expected to be well prepared to meet developing countries' import needs since these may be largely in line with domestic production and demand preferences in Brazil. For example, developing countries may ask for low-priced products rather than high quality standards adhered to in developed countries. In particular, exports to Third World countries that have not yet reached the industrialization level of Brazil may largely consist of capital-intensive goods. Compared to other developing countries, Brazil is probably better equipped with physical capital and human skills.

As far as exports to ALADI members are concerned, additional factors must be taken into account. Although LAFTA did not succeed in liberalizing trade between the 11 member countries as envisaged in the 1960s, preferential trading arrangements favoured trade within LAFTA and discriminated against imports from third countries. In 1977, about 40 per cent of intra-LAFTA trade flows enjoyed preferential treatment. Preference margins relative to cif-prices plus tariffs levied on non-LAFTA imports amounted to 20-30 per cent in the 1970s. In this way, national import-substitution policies were elevated to the regional level. Hence, Brazilian exports to the Latin American market are likely to be biased in favour of products that require large inputs of both physical and human capital [Diaz Alejandro, 1974] (1).

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(1) Subsequently, export conditions within LAFTA were increasingly characterized and complicated by bilateral trading arrangements, especially when the overall liberalization approach was abandoned and the rather lax co-operation ALADI replaced LAFTA in 1980. The impact this change has had on Brazil's exports can, however, only be assessed in the context of detailed sector studies.

A further hypothesis relates to the heavy fluctuations in relative import-ance of Brazilian exports to the Latin American region. Presumably, it is mainly the ALADI region that serves as a temporary outlet for excess production at times of depressed domestic demand in Brazil. Further-more, exports to ALADI may be considered partly to offset bottlenecks in selling to developed countries, due either to the sluggish demand or the eroded competitiveness of Brazilian exports in markets without pref-erential access for Brazilian suppliers.

Finally, the Latin American approach of discriminating against imports from outside the region may have led to distinctly different characteris-tics of exporting versus non-exporting firms in Brazil. Import-substitu-tion policies gave rise to foreign direct investment by multinational cor-porations which attempted to secure access to Latin American markets. Since multinationals located in Brazil will strive to serve the whole ALADI region and engage in intra-firm trade with parent companies in developed countries as well, one can assume that these companies may have been spearheads of export expansion in Brazil. Due to attempts to foster intra-industry specialization among ALADI members, participating enterprises may operate on a significantly larger scale than firms sup-plying domestic markets only. Moreover, since Brazil belongs to the most advanced economies within ALADI, it would specialize in relatively capi-tal-intensive productions. These hypotheses are subjected to empirical tests in the subsequent chapters.

IV. Comparative Advantage, Economic Policy, and Export Performance

1. Brazil's Revealed Comparative Advantages in Different Markets

A frequently-applied method of obtaining information on the relative competitiveness of different industries is the concept of revealed comparative advantage (RCA), which calculates the excess of an industry's exports over its imports, relative to the country's total net exports. Thus, RCA analysis allows a ranking of the different Brazilian industries with respect to their international competitive position. The following formula presents the basis for the RCA calculations reported below [1]:

$$RCA_i = \left(\frac{x_i - m_i}{x_i + m_i} - \frac{\sum_i (x_i - m_i)}{\sum_i (x_i + m_i)} \right) \cdot F_{1,2}$$

$$\text{where } F_1 = \frac{100}{1 - \dfrac{\sum_i (x_i - m_i)}{\sum_i (x_i + m_i)}} \quad \text{if} \quad \frac{x_i - m_i}{x_i + m_i} > \frac{\sum_i (x_i - m_i)}{\sum_i (x_i + m_i)}$$

$$\text{where } F_2 = \frac{100}{1 + \dfrac{\sum_i (x_i - m_i)}{\sum_i (x_i + m_i)}} \quad \text{if} \quad \frac{x_i - m_i}{x_i + m_i} < \frac{\sum_i (x_i - m_i)}{\sum_i (x_i + m_i)}$$

and x_i = exports of commodity i;
m_i = imports of commodity i.

A clear distinction has to be drawn between the RCA concept and comparative advantages which, according to the theory of international trade,

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[1] In the case of the RCA calculations for different export destinations, an additional index j for the respective region has to be attached to x and m. The formula restricts the possible values to the interval between -100 and +100. A positive value for a specific branch indicates that its international competitiveness was stronger than on average of the industrial sector and vice versa.

determine the structure of production and, therefore, also trade patterns. Instead of referring to factor endowments, the RCA concept tries to evaluate the international competitiveness of industries by referring to their actual export performance. In cases of serious distortions in goods and factor markets, favourable RCA values may result from these distortions rather than from comparative advantage.

Table A9 provides an overall picture of the RCA values of 47 branches of Brazil's industrial sector in their trade with the world for selected years during the 1965-1982 period [Dippl, 1986, pp. 22 ff.]. As regards non-manufactured export items (1), the competitiveness of many branches of the (natural) resource-intensive food industry has been strong since 1965 (e.g., the production and/or processing of meat, fruits, sugar, coffee and cocoa). The same holds true for the production of non-alcoholic beverages as well as for the tobacco industry. Some products that were not traded at the beginning of the investigatory period quickly proved to be competitive in world markets (e.g., oil from soy-beans, SITC 421, and non-alcoholic beverages, SITC 111). As regards metals, the evidence is mixed. Whereas in iron and steel production (SITC 67) competitiveness in world markets improved considerably in the early 1980s, highly negative RCA values are shown for non-ferrous metals.

The international competitiveness of manufacturing industries of Brazil is considered in more detail below, especially by looking at different export markets (2). In addition to the RCA concept, the international competitiveness across manufacturing industries is analysed on the basis of the export-performance ratios presented in Table 9. These ratios confront Brazil's commodity structure of manufactured exports with the corresponding structure of world exports (for the formula of calculation, see the note to Table 9). The basic notion is that Brazil may possess a competitive advantage (disadvantage) if the share of an export category in

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(1) The interpretation of Table A9 will be restricted to branches belonging to the non-manufactured category (SITC 0, 1, 4, 67, and 68) since manufactured exports will be considered in more detail in the following paragraphs.
(2) For earlier studies, see for example Lowinger [1971], Tyler [1972], Rocca, de Barros [1972], Nishijima [1980], Savasini [1978]; for a summarizing discussion of different measures of revealed comparative advantage, see UNIDO [1986, pp. 4 ff.].

Table 9 - Export Performance Ratios for Brazilian Manufactured Exports to Different Markets, 1962-1981 (a)

Destination country	1962	1967	1968	1973	1974	1978	1979	1981
SITC 5 chemicals								
World	3.30	1.92	1.68	0.78	0.81	0.52	0.60	0.86
Developed economies	4.40	2.61	2.54	0.81	0.93	0.56	0.58	1.02
Developing economies	1.04	1.08	0.84	0.67	0.59	0.49	0.61	0.72
ALADI	0.55	0.58	0.40	0.50	0.42	0.49	0.29	0.66
NICs	0.82	0.49	0.38	0.94	0.95	0.81	0.87	1.72
Centr.-planned economies	4.65	2.00	1.27	0.84	0.70	0.49	0.74	2.59
SITC 6-(67+68)+8 basic and miscellaneous manufactures								
World	0.66	1.00	1.21	1.75	1.48	1.20	1.21	1.04
Developed economies	0.67	1.04	1.27	1.87	1.58	1.38	1.40	1.21
Developing economies	0.60	0.89	1.17	1.47	1.29	0.96	1.01	0.89
ALADI	0.88	1.50	1.97	1.86	1.63	1.54	1.29	1.24
NICs	0.27	1.06	1.39	1.14	1.01	0.66	1.29	0.87
Centr.-planned economies	0.83	2.70	0.90	3.25	3.24	4.06	3.56	3.00
SITC 7 machinery and transport equipment								
World	0.68	0.76	0.67	0.53	0.73	0.99	0.97	1.01
Developed economies	0.36	0.55	0.38	0.36	0.56	0.82	0.81	0.83
Developing economies	1.27	1.05	0.95	0.85	0.98	1.13	1.10	1.13
ALADI	1.16	0.94	0.85	0.89	1.04	0.98	1.06	1.00
NICs	0.00	1.19	0.95	0.92	1.02	1.39	0.87	1.03
Centr.-planned economies	0.48	0.00	0.00	0.01	0.03	0.04	0.05	0.01

(a) Export performance ratio defined as:

$$ep_{ij} = \frac{X_{ij}}{\sum_i X_{ij}} \Big/ \frac{XW_{ij}}{\sum_i XW_{ij}} \quad ; \quad ep_{ij} \begin{cases} < 1 \text{ revealed comparative disadvantage} \\ = 1 \text{ "normal"} \\ > 1 \text{ revealed comparative advantage} \end{cases}$$

X = value of Brazilian exports
XW = world exports
i = SITC category (5, 6+8, 7)
j = region (six export markets)

Source: UN [a]; own calculations.

Brazil's total manufactured exports is greater (smaller) than the respective share of this category in total world exports of manufactures.

As was to be expected, great differences in export-performance ratios existed both between SITC groups and export markets (1).

- Brazil seems to be most competitive in exporting products falling into the basic and miscellaneous manufactures category (SITC 6-(67+68)+8) which consists largely of relatively labour-intensive goods. Export-performance ratios improved considerably during the 1960s and early 1970s, when outward-looking economic policies were implemented. Though still above one, ratios declined after 1973 when Brazil returned to import-substitution policies. Even though this trend applied to all major export markets, some differences are worth mentioning. Export-performance ratios were higher than average in the case of exports to developed countries and ALADI members, but considerably lower for non-ALADI developing countries. The favourable performance in developed country markets supports the hypothesis that, vis-à-vis advanced economies, Brazil is most competitive in manufacturing labour-intensive products. High performance ratios for exports of SITC groups 6 and 8 to ALADI may be partly attributed to discriminations against imports from outside this region. Brazil probably benefited from trade diversion at the expense of Asian competitors, for example. This reasoning is consistent with the comparatively poor export performance in non-protected Third World markets.

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(1) With shares of 10-15 per cent in total Brazilian manufactured exports to developed and ALADI countries in the 1970s, chemical exports (SITC 5) were of minor importance to Brazil. This industry shows the highest capital intensity within the Brazilian manufacturing sector (Table A6), consequently the international competitiveness can be expected to be rather poor, particularly in trade with developed countries. On the whole, export-performance ratios and RCA values support this view. Export-performance ratios are below one throughout the 1970s, irrespective of the market considered. The more detailed analysis of RCAs in Table A10 shows extremely high negative values (i.e., trade deficits) for almost all subgroups of SITC 5 in trade with developed countries. In trade with ALADI and total developing countries, a less uniform picture emerges: RCAs improved during the 1970s and were significantly positive for several subgroups.

The net trade measures for basic manufactures (SITC 6) reveal a somewhat different picture (Table A10). At the overall level, RCAs are positive for ALADI and other Third World markets but negative for the developed country market (apart from in 1978). Brazil experienced a trade surplus in almost all the sub-groups of SITC 6 with developing countries and ALADI, except in paper and leather products. In trade with developed economies, positive RCAs are concentrated on the most labour-intensive sectors (leather and wood products, textiles); trade deficits prevailed in sectors such as paper products, metallic and non-metallic mineral products, i.e., the more capital-intensive industries (see Table A6).

RCAs for miscellaneous manufactures (SITC 8) improved during the 1970s for all Brazil's major export markets. However, this trend started much earlier and was more pronounced for (net) exports to all developing countries and particularly to ALADI. It was obviously harder to become competitive in exporting miscellaneous manufactures to developed country markets than to the protected ALADI market. Again, considerable differences exist between industries at the 2-digit SITC level. Throughout the whole period, trade performance with both developing and developed countries was most favourable for furniture and footwear. Improvements were most remarkable for travel goods and clothing, especially in trade with developed countries. On the other hand, Brazil failed to achieve trade surpluses vis-à-vis advanced economies as regards instruments and printed matter.

- For machinery and transport equipment (SITC 7), the traditional RCA concept generally results in negative values as regards Brazil's trade with the world. However, the net trade measure (Table A10) as well as export performance ratios (Table 9) show significant differences between Brazil's major export markets. For markets in developed countries, RCAs are negative and export performance ratios below one throughout the whole period, but the latter measure improved considerably after 1973. Production may have become more standardized in the 1970s so Brazil may achieve competitiveness in developed country markets if this trend continues. On the other hand, Brazil has experienced surpluses in trade with total developing countries and the ALADI region. Export-performance ratios were above or very close to

one. The performance was most remarkable in non-electrical machinery and transport equipment. Presumably, preferential trading arrangements within ALADI gave a major impetus to Brazilian exports of these categories to the protected Latin American market. However, the success in trade with other developing countries also supports the hypothesis that Brazil, which is better equipped with physical and human capital than the majority of developing countries, is competitive in exporting relatively capital-intensive products to less advanced economies. This confirms expectations that Brazil was better prepared than the developed countries to meet developing countries' import needs due to similarities in demand. Exports of vehicles have, for example, gone almost exclusively to developing countries [World Bank, a, p. 119].This was partly related to similar fuel conditions in the importing countries (i.e., low octane fuel) and better adaptation to the typically rough road conditions in the Third World (1).

There is some evidence to show that the assessment of Brazilian export performance would be biased rather on the low side if based on RCA calculations. If traditional RCA values are compared to an index based on production rather than trade data (2), the number of sectors with a revealed comparative advantage will be greater according to the latter measure (3). This holds true for industries within SITC 7 and 8 in particular.

Due to the aforementioned conceptual limitations, the analysis of export performance ratios and RCAs can only serve as a starting point in as-

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(1) The export performance of Brazil was most favourable for multiple-use pick-ups and utility vehicles, i.e., types of vehicles which are best adapted to rough usage.

(2) Bowen [1983] proposed to reveal a country's competitive advantages through its production relative to world production. This index is considered superior to the traditional RCA concept since it covers a much wider spectrum of commodities in which a country may achieve international competitiveness. This is so because a country produces many more goods than are actually exported. We present Bowen's index merely as additional information since this measure cannot be calculated for separate export markets.

(3) See Nunnenkamp, Fasano-Filho [1986, Table A8] for the calculation of both measures at the 4-digit SITC level, and Table A11 for a summary presentation. As has already been noted, export-performance ratios show a more favourable picture in the case of SITC 6+8 as well.

sessing the international competitiveness of Brazilian manufacturing industries. It will be supplemented below by applying the so-called Lary concept in analysing factor intensities of Brazilian manufacturing industries (Section IV.2) and by assessing the role of economic incentives in explaining Brazil's manufactured export performance (Section IV.3).

2. Factor Intensity and Export Performance of Brazilian Industries

The analysis in the preceding paragraphs has shown significant differences in Brazilian trade patterns with developed economies on the one hand and developing countries (especially ALADI members) on the other. In trade with advanced countries, Brazil's export performance was most favourable in products generally considered to be labour-intensive. This was predicted by the standard Heckscher-Ohlin theory of international trade, according to which the potential for export growth lies in products that intensively use the relatively abundant factors of production. In trade with developing countries, competitiveness was also achieved in rather capital-intensive industries, which again is consistent with the expectations raised in Section III.4.

However, after 1973 Brazil considerably expanded its exports of machinery and transport equipment to developed countries as well, so that the differences in the commodity composition of Brazilian manufactured exports to its major trading partners were somewhat reduced. It is mainly this observation that requires further investigation, since conflicting hypotheses are involved. A first hypothesis suggests an explanation in terms of factor absorption in Brazilian industries. Notwithstanding high overall capital intensity, Brazil may have comparative advantage in machinery and transport equipment if these products are of a highly standardized nature (product-cycle goods). The well-known Lary concept [Lary, 1968] will be applied to test this hypothesis. On the other hand, it may be due to policy interventions (i.e., economic policies conflicting with comparative advantage) that export structures became more similar after 1973. The role of economic policies will be discussed in Section IV.3.

The Lary concept claims that, under certain assumptions, value added per employee in different industries can be taken as a proxy for capital intensity (1). A figure above the average for total manufacturing indicates relatively high capital intensity of an industry and vice versa. In contrast to the index of overall capital intensity referred to in Table A6 (based on capital investment per employee), separate measures of physical and human capital intensity can be calculated by applying the Lary concept. This is most important in the context of the product-cycle hypothesis. Standardized product-cycle goods are characterized by minor human skill requirements, but may still absorb considerable amounts of physical capital. According to Lary, human capital intensity is indicated by a high wage content in value added per employee and physical capital intensity by a high non-wage value added per employee respectively.

Table 10 presents factor intensities for 15 Brazilian manufacturing industries relative to the average for total manufacturing (2). Three different groups of industries can be identified with respect to overall capital intensity:

- Footwear, apparel, wood products, furniture and fixtures, leather products, and textiles are clearly labour-intensive, since value added per employee is significantly below average;

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(1) Factor intensities can only be calculated for total production rather than export production, since information on value added or wage content of exports is not available. Furthermore, results may be biased due to differences in factor and product-market distortions between industries. Thus, Lary measures provide an approximation to reality only (for a more detailed discussion, see Wolter [1975, pp. 31 ff.]).

(2) Industries are defined according to International Standard Industrial Classification (ISIC). Data are presented for all Brazilian manufacturing industries for which information is available in UNIDO [1984]. Tables A12 and A13 provide additional information on factor intensities in Brazil relative to various country groups that represent its major trading partners. That is because one of the crucial assumptions in deducing comparative advantage from relative factor intensities is that of non-existence of factor intensity reversals. According to correlations run for factor intensities in Brazil (value added, wages and non-wage value added per employee) on the one hand and the corresponding figures for developed market economies, high and middle-income developing countries, and ALADI on the other hand, this assumption seems to be justified. All Spearman rank correlation coefficients are significantly positive at least at the 3 per cent level.

Table 10 - Factor Intensities in Brazilian Manufacturing Industries, 1980 (a)

ISIC	Industry	Value added	Wages	Non-wage value added
		per employee		
311/2	Food products	97.1	71.4	106.5
321	Textiles	84.1	82.1	86.9
322	Apparel	57.2	60.7	57.9
323	Leather products	83.3	85.7	85.0
324	Footwear	49.3	64.3	46.7
331	Wood products	63.8	67.9	64.5
332	Furniture, fixtures	73.2	96.4	69.2
341	Paper products	129.0	107.1	138.3
342	Printing, publishing	104.3	146.4	96.3
352	Other chemicals	185.5	164.3	196.3
355	Rubber products	133.3	n.a.	n.a.
356	Plastic products	102.9	82.1	111.2
382	Non-electr. machinery	90.6	135.7	81.3
383	Electrical machinery	131.2	128.6	135.5
384	Transport equipment	118.1	128.6	118.7

(a) As a per cent of total manufacturing industries.

Source: UNIDO [1985]; own calculations.

- The group of relatively capital-intensive industries consists of transport equipment, paper products, electrical machinery, rubber products, and other chemicals (in ascending order).

As regards the product-cycle hypothesis, the last group is of particular interest. Comparing Brazil with average figures for developed market economies, there is indeed some evidence pointing to the international competitiveness of Brazil based on standardization. Whereas physical capital intensity for the industries of this group (1) is only marginally

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(1) For rubber products, the differentiation of value added into wage and non-wage components is not possible due to missing data.

competitiveness of Brazil based on standardization. Whereas physical capital intensity for the industries of this group (1) is only marginally lower in Brazil than in developed countries (or even higher as in electrical machinery and transport equipment), human capital intensity is 2.9 to 4.4 times higher in developed countries (Table A13). However, all Brazilian industries with high overall capital intensity (i.e., ISIC categories 341, 352, 383, 384) show above average human capital intensity as well, so that the standardization argument does not apply to them.

Ranking all Brazilian industries according to wages and non-wage value added per employee, a strongly positive correlation between human and physical capital intensity emerges. The Spearman coefficient of 0.65 is significant at the 1 per cent level, whereas the same correlation (0.30) remains insignificant in the case of developed market economies. The potential for developing countries to achieve international competitiveness via specialization in standardized product-cycle goods may well exist, but Brazil does not seem to have grasped this opportunity to any significant extent. Only the food and the plastics industries, both of an average overall capital intensity, should, due to relatively low human capital intensity, be competitive in world markets. The paper industry represents an ambiguous case: the index for relative human capital intensity is considerably below that for overall capital intensity, though still above the average for total manufacturing. The relative position of machinery and transport equipment in human skill requirements is even more unfavourable than in overall capital intensity. The success of these industries in exporting to developed economies has to be attributed to policy interventions rather than to standardization.

This conclusion is supported by correlation analysis, relating factor absorption in Brazilian industries to export performance in different markets (2). Table 11 presents Spearman and Pearson coefficients for corre-

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(1) For rubber products, the differentiation of value added into wage and non-wage components is not possible due to missing data.

(2) The following analysis is based on a sample of 13 industries which accounted for 81 per cent of total manufactured exports of Brazil in 1981. Food products (ISIC 311/2) are neglected because they are not considered as manufactured exports in Table A9; for "other chemicals" (ISIC 352), the SITC classification does not provide a corresponding category.

Table 11 - Spearman and Pearson Coefficients for Correlations between Factor Intensities in Brazilian Industries and Brazil's Export Pattern (a), 1967-1981

Export markets and periods	Value added per employee		Wages per employee		Non-wage value added per employee	
	Spearman	Pearson	Spearman	Pearson	Spearman	Pearson
World						
1967	0.07	n.c.(b)	0.23	n.c.	-0.01	n.c.
1973	-0.38*	-0.27	-0.15	n.c.	-0.34	n.c.
1981	0.16	n.c.	0.36	0.49*	0.33	n.c.
Δ1967-1973 (c)	-0.15	n.c.	-0.37	-0.50**	-0.04	n.c.
	(-0.28)	(-0.52)**	(-0.49)*	(n.c.)	(-0.17)	(-0.46)*
Δ1973-1981 (c)	0.59**	n.c.	0.62**	n.c.	0.50**	0.34
	(0.68)***	(n.c.)	(0.52)**	(0.26)	(0.61)**	(n.c.)
Developed market economies						
1967	-0.27	n.c.	0.25	n.c.	-0.20	n.c.
1973	-0.58**	n.c.	-0.44*	-0.38	-0.50**	-0.38
1981	-0.10	n.c.	0.07	n.c.	-0.15	n.c.
Δ1967-1973	-0.23	n.c.	-0.46*	n.c.	-0.13	n.c.
Δ1973-1981	0.36	n.c.	0.42*	n.c.	0.22	n.c.
Developing countries						
1967	0.49**	0.10	0.47*	n.c.	0.37	n.c.
1973	0.37	n.c.	0.41*	n.c.	0.33	n.c.
1981	0.62**	0.31	0.53**	n.c.	0.62**	0.33
Δ1967-1973	-0.10	n.c.	-0.13	n.c.	0.14	n.c.
Δ1973-1981	0.18	n.c.	0.24	0.42*	0.20	n.c.
ALADI						
1967	0.53**	0.07	0.55**	n.c.	0.40	n.c.
1973	0.45*	0.20	0.49*	n.c.	0.40*	0.20
1981	0.57**	0.30	0.52**	n.c.	0.55**	0.30
Δ1967-1973	-0.04	n.c.	-0.04	n.c.	0.20	n.c.
Δ1973-1981	0.12	n.c.	-0.02	n.c.	0.18	n.c.

(a) Correlations between factor intensities (see Table 10) and export shares of the respective industries in total Brazilian manufactured exports to various markets (see Nunnenkamp, Fasano-Filho [1986, Table A6]). "Δ" denotes the change in export shares in percentage points. Pearson coefficients are given only if correlation results differ between both procedures, i.e., Spearman rank correlations being statistically significant and Pearson correlations remaining insignificant, and vice versa. - *** ≙ significant at the 1 per cent level; ** ≙ significant at the 5 per cent level; * ≙ significant at the 10 per cent level. - (b) n.c. ≙ not calculated. - (c) Change in export shares in per cent in parentheses.

Source: Table 10 and Nunnenkamp, Fasano-Filho [1986, Table A6]; own calculations.

lations between overall, human and physical capital intensity in Brazilian industries on the one hand and the share of the respective industries in total manufactured exports of Brazil to its major markets in various years (and the change in export shares) on the other (1). First of all,

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(1) Data on factor intensities are for industries defined according to ISIC, whereas trade data are based on the SITC classification of industries. The relationship between industrial and trade classifica-

the results confirm the strict difference in Brazil's export patterns to different markets (1). In exporting to developing countries and, particularly, to ALADI, a positive relationship between capital intensity and export shares is evident. Over the whole period under consideration, industries with the most favourable export performance in the ALADI region absorbed relatively large amounts of capital, both human and physical. The stability of this relationship is confirmed by the rather small and insignificant coefficients for correlations between the change in export shares in 1967-1973 and 1973-1981 and factor intensities.

On the other hand, a clearly negative relationship between capital intensities and export shares is shown for Brazilian exports to developed countries, which is in line with the standard Heckscher-Ohlin theory of international trade. A closer look at the results for this export market reveals further interesting insights:

- Contrary to the product-cycle hypothesis, correlation coefficients do not differ very much when export shares in 1967, 1973 and 1981 are related to human capital intensity on the one hand and physical capital intensity on the other. According to the standardization argument, the negative relationship between capital intensity and export shares should be stronger (not weaker as indicated in Table 11) for wages per employee than for non-wage value added per employee.

- It may still be argued that the standardization argument is relevant, considering the strongly negative correlation between human capital intensity and the change in export shares in 1967-1973, when the coefficient remains insignificant for physical capital intensity. However,

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tion has been established in a rather crude manner. For example, the calculation of export shares is based on manufactured exports exclusively, though some ISIC categories include products belonging to SITC groups 2 and 4 as well. Moreover, 2-digit SITC categories are not further disaggregated so that the definition of industries is not completely consistent. Consequently, the results must be interpreted with some caution.

(1) Both Spearman rank correlations and Pearson correlations reveal the same results on the whole. Thus, Pearson coefficients are reported only if rank correlations show statistically significant coefficients whereas Pearson coefficients remain insignificant, and vice versa. Generally, rank correlation analysis shows better results in terms of significance.

this interpretation conflicts with the significantly positive coefficient calculated for human capital intensity in the 1973-1981 period.

- Economic policies of the Brazilian government seem to have influenced Brazil's export performance in world markets. Relating capital intensity to the change in export shares, coefficients are negative (though not significant at the 10 per cent level in many cases) for 1967-1973, i.e., when the government shifted to a more outward-oriented development approach and reduced the conflict between Brazil's comparative advantages and the distortions which arose from import-substitution policies. Coefficients are positive for 1973-1981, when the country returned to an active import-substitution policy after the first oil price shock of 1973. Consequently, the negative relationship between capital intensity and export shares is most evident in 1973, but considerably weaker in 1967 and 1981.

- The hypothesis that the favourable export performance of Brazilian machinery and transport equipment industries in developed countries must be partially attributed to policy interventions is also supported by correlation analysis. When electrical and non-electrical machinery as well as transport equipment are excluded from the analysis (Table A14), the negative relationship between capital intensity and export shares becomes considerably stronger, compared to correlation results for all industries.

3. Economic Policy and Brazil's Manufactured Export Performance

a. Remarks on the Relevance of Economic Policy

According to the evidence presented in the preceding sections, there is enough reason to consider economic policy as an important factor in explaining Brazil's favourable export performance in the past (1):

(1) For former studies that have dealt with the effect of export incentives and other trade policies on Brazilian export expansion, see Bergsman [1970], Tyler [1976; 1980; 1983], Savasini [1978], de Carvalho, Haadad [1978], Musalem [1984], and Teitel, Thoumi [1986]; for a review, see Braga, Markwald [1983].

- The RCA analysis has shown that the share of Brazilian exports from industries with positive RCA values in total manufactured exports improved from 80 and 68 per cent in 1962 for exports destined to developing countries and ALADI members, respectively, to 97 per cent for both regions in 1981 (Table A15). However, a different picture emerged with respect to exports to developed countries. In this case, the trend of rising export shares of industries with positive RCA values (1962: 17 per cent; 1973: 61 per cent) was reversed after 1973 (1981: 34 per cent), which may be attributed to the shift in economic policies after the first oil price shock.

- The correlation analysis between factor intensities and export performance pointed to the relevance of economic policy as well. For exports to developed countries, the (negative) relationship between capital intensity and export shares was most evident in 1973, but, later on, weakened considerably.

The analysis of Brazilian economic policy in general and towards exports in particular may well have implications for her future export prospects. It may be argued that export expansion cannot be sustained in the long run if mainly based on policy interventions that are in conflict with Brazil's comparative advantages. Economic policy affects the export performance of a country in two ways. Firstly, overall financial and monetary policies of developing countries frequently result in domestic inflation rates in excess of world market price increases. Thus, the *global* international competitiveness of these countries' manufacturing sectors depends on whether the exchange rate is flexible enough to correct divergencies between the national and the international price trend. Changes in the exchange rate affect the different branches of the manufacturing sector at the same rate. In the case of domestic inflation exceeding inflation abroad, a nominal depreciation of the domestic currency to the amount of the inflation differential is required to keep the real exchange rate, and thus international price competitiveness, constant.

Secondly, in addition to determining the global competitiveness of manufacturing by the exchange-rate policy, economic policies are likely to affect the *relative* competitiveness of different industries. It is typical

for economic incentives such as fiscal and financial bonuses and protectionist measures to be unevenly distributed, i.e., to discriminate between industries. Thus, the inter-industry allocation of production factors is affected and domestic producers concentrate on activities where the officially-granted incentives are particularly high. The resulting pattern of industrial specialization may well be in conflict with the country's comparative advantages, i.e., international competitiveness of industries may be artificially created by policy interventions rather than based on an efficient use of factors of production according to the country's relative factor endowments. At the prevailing exchange rate, high cost-producing firms may successfully compete in international markets in particular because of firm or industry-specific export subsidies.

In the following sections, the impact of major economic policy instruments on Brazilian export performance is empirically analysed. Section IV.3.b. focuses on the exchange rate as the major determinant of global competitiveness of the Brazilian manufacturing sector. How industry-specific incentives affected the pattern of industrial specialization in Brazil is subsequently discussed.

b. Overall Competitiveness and Real Exchange Rates

α. The Development of Real (Effective) Exchange Rates in Brazil (1)

To ensure the international price competitiveness of a country's exports, the exchange-rate policy should be flexible enough to adjust to divergencies between national and international inflation rates. Thus, when domestic inflation exceeds inflation abroad, a nominal depreciation of the domestic currency to the amount of the inflationary margin would be necessary to keep the real exchange rate and thus price competitiveness on foreign markets constant.

Table 12 presents calculations of inflation-adjusted (i.e., real) exchange rates of the cruzeiro vis-à-vis a basket of currencies of Brazil's major trading partners. Export unit values were used as proxies for prices of

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(1) This and part of the following paragraph is based on Dippl [1986, pp. 16 ff.].

Table 12 - Indices of the Real Exchange Rate of the Cruzeiro (a), 1965-
1983 (1965=100)

Year	Nominal exchange rate	Subsidies as a percentage of export prices (fob) (b)	Real exchange rate indices			
			based on export unit values		based on wholesale prices	
			without subsidies	with subsidies	without subsidies	with subsidies
1965	1.899	5.0	100.0	100.0	100.0	100.0
1966	2.220	5.0	107.9	107.9	87.2	87.2
1967	2.663	21.3	109.2	123.8	85.7	99.1
1968	3.396	26.2	109.9	132.0	85.5	102.8
1969	4.075	34.0	110.0	140.4	90.2	115.1
1970	4.594	43.8	104.5	143.2	85.7	117.5
1971	5.288	47.5	113.4	159.3	87.1	122.4
1972	5.934	48.5	105.6	149.5	87.6	123.9
1973	6.126	50.5	81.7	117.1	81.6	116.9
1974	6.790	52.5	80.1	117.4	82.1	119.2
1975	8.127	62.3	91.4	141.3	85.2	131.7
1976	10.673	74.0	80.7	133.8	79.5	131.8
1977	14.144	71.5	71.2	116.4	81.5	132.6
1978	18.070	73.5	86.5	143.0	84.8	140.1
1979	26.945	67.0	91.8	146.0	94.3	150.0
1980	52.714	58.6	98.4	148.6	104.4	157.7
1981	93.125	66.8	111.0	176.9	92.2	146.5
1982	179.514	n.a.	116.7	n.a.	91.4	n.a.
1983	577.040	n.a.	122.3	n.a.	107.8	n.a.

(a) Vis-à-vis the currencies of Brazil's major trading partners: the
USA, the Federal Republic of Germany, Argentina, Italy, the Nether-
lands, the United Kingdom, Japan, France, and Spain. Bilateral trade
weights for 1965-1980 were taken from Cardoso; for the more recent
years, own calculations. - (b) Subsidy rates for 1965-1978 were taken
from Musalem; for 1979-1981 from Horta.

Source: IMF [b]; Cardoso [1980; 1982]; Musalem [1984]; Horta [1983];
own calculations.

formance on foreign markets because they capture those goods actually
traded [Maciejewski, 1983, p. 511 ff.]. The index shows that the
cruzeiro depreciated in real terms during the late 1960s and early 1970s
compared to 1965, the depreciation reaching its peak in 1971. In the
following years, however, nominal depreciations were mostly insufficient
to compensate for the relatively high domestic inflation rates. In 1977,
real appreciations of the cruzeiro resulted in an "overvaluation" of the
Brazilian currency of nearly 30 per cent compared to 1965. After that
year, the cruzeiro depreciated continuously in real terms again and, in
1980, the preceding "overvaluation" was eliminated.

year, the cruzeiro depreciated continuously in real terms again and, in 1980, the preceding "overvaluation" was eliminated.

A second index of the real exchange rate of the cruzeiro was calculated by using wholesale prices as deflators. Contrary to the export unit value index, the wholesale price index actually measures price changes and, because of its broader coverage, it also reflects price developments for potentially exportable goods. However, it should be borne in mind that this index includes the price developments of non-traded goods as well as imported goods used for domestic consumption [Maciejewski, 1983, pp. 516-527]. According to this index, the cruzeiro was permanently "overvalued" in real terms in the second half of the 1960s and in the 1970s if compared with its base value in 1965. Between 1966 and 1976 the cruzeiro appreciated - modestly - by about 9 per cent. Thereafter, this trend was reversed by nominal depreciations sufficient to reduce the value of the cruzeiro also in real terms during the late 1970s and to eliminate the existing "overvaluation" in 1980. After a substantial real appreciation in 1981, the major devaluation in February 1983 as well as frequent mini-devaluations again overcompensated the preceding appreciation.

In determining the international competitiveness, however, not only exchange-rate policies matter, but also industry-specific interventions. In Brazil's case, subsidies have played a major and increasingly-important role since the mid-1960s in stimulating manufactured exports. According to the estimates of Musalem [1984] and Horta [1983], the local currency remuneration per unit of foreign exchange earned through exports was increased through subsidies by 5 per cent in 1965 and this percentage rose continuously to 74 per cent in 1976. In 1980, when the export tax credit (crédito prêmio) was abolished, the subsidy rate still amounted to 59 per cent and with its re-introduction in 1981 the rate increased to 67 per cent. Basically, these incentives allowed a reduction in the domestic currency export price. Thus, at the prevailing exchange rate, some high cost-producing firms could compete in international markets only because of these subsidies. Firms already competitive in world markets, however, could simply use the assistance provided to increase their profits.

Taking into account export subsidies, the real effective exchange-rate index based on export prices largely follows the movement of that without subsidies. However, the former index indicates that an exporter's real domestic currency remuneration per unit of foreign exchange earned was permanently higher than in 1965. In 1977, the index without subsidies indicates the highest "overvaluation" of the cruzeiro during the whole period (28.8 per cent); the index including subsidies still shows a real effective depreciation of 16.4 per cent, meaning that, for one unit of foreign exchange, an exporter received 16.4 per cent more in real terms than in 1965. Between 1971 and 1977, however, the real effective devaluation of the cruzeiro decreased as compared to the base period 1965. On the contrary, the real effective exchange-rate index based on wholesale prices shows that the real domestic currency remuneration per unit of foreign exchange increased rather continuously since 1966, which should have been favourable to the growth of exports.

β. Exchange-Rate Effects on the World Market Performance of Brazilian Manufacturers

Recent findings based on time-series analysis suggest that the real exchange rate has been an important determinant of Brazil's export performance in the manufacturing sector. Surprisingly, however, the real effective exchange rate (1) proved to be insignificant. In order to assess the importance of real and real effective exchange rates for the export performance of Brazilian manufactured goods, an export supply function has been estimated [Dippl, 1986, pp. 19 ff.]:

$$\ln X = a + b \ln R + c \ln P + d \ln U + \varepsilon$$

where:

X = real manufactured exports;
R = index of the real exchange rate (excluding and including subsidies);

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(1) The term "effective" is used in this context to denote that the export subsidies are accounted for.

P = index of manufacturing output;

U = rate of industrial capacity utilization;

ε = error term.

Under the assumption that Brazil is a small country with respect to the exportation of manufactured goods, the export-supply function is statistically identified and thus can be estimated by the ordinary least square method. Changes in the real exchange rate R then cause shifts in the perfectly elastic demand curve and these shifts trace out the export-supply function [Tyler, 1976, p. 306]. Over the period under consideration, Brazil has experienced a considerable growth of manufactured output which can also be expected to have increased the export supply. To cover these potential shifts to the right in the export-supply function, the variable P has been introduced. Furthermore, it has been argued by various authors (e.g., Donges, Müller-Ohlsen [1978, pp. 141-142]; Tyler [1976, pp. 265-266]; Pomfret [1975, pp. 469-470]) that the rate of capacity utilization (U) is an important determinant of manufactured export behaviour. It is hypothesized that, in periods of slackening domestic demand, firms try to compensate for the decline in domestic sales through increased efforts to export while, in boom periods, production is mainly sold in the domestic market. Thus, the expected sign of d is negative, while b and c are expected to be positively related with the export supply.

Regressions were run for the 1965-1981 period by using indices of the real exchange rate of the cruzeiro, excluding and including subsidies (1). In the first case when subsidies were not taken into account, the regression analysis yielded the following results (2):

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(1) The indices are those of Table 12, which were computed by using wholesale prices as deflators. They are applied in the regression analysis because real manufactured exports have also been calculated by applying wholesale prices as a deflator. This index is assumed to be more appropriate than export unit values in calculating real manufactured exports because export unit values capture the price trend of non-manufactured exports as well. The index of manufactured output (P) for 1965-1980 has been taken from World Bank [b, p. 156] and updated from FGV [1985]. The rate of capacity utilization (U) for 1968-1981 is also from World Bank [b, p. 162]; for 1965-1967, U has been estimated as the ratio of actual manufactured output to the time trend of manufactured production.

(2) t-statistics in parentheses; * = significant at the 10 per cent level; ** = significant at the 1 per cent level (two-tailed t-test).

$$\ln X = -6.456 + 3.209^* \ln R + 3.050^{**} \ln P - 3.967 \ln U$$
$$(2.15) \qquad\qquad (13.88) \qquad\qquad (-1.28)$$

$$\bar{R}^2 = 0.93 \quad F(3,13) = 68.73 \quad \text{D.W.} = 1.85$$

These results suggest that the real exchange rate has been an important determinant of Brazil's export performance in manufactures. The estimated parameter of R indicates that a real depreciation of the cruzeiro by 1 per cent would have resulted in an increase of manufactured exports by 3.2 per cent. The expansion of manufactured production had a strong and positive influence on manufactured exports as well. The recession-boom variable U has the expected sign but proved to be insignificant in explaining manufactured export behaviour.

When applying the real effective exchange rate - i.e., taking subsidies into account - as an explanatory variable of export performance, the following results were obtained (1):

$$\ln X = -2.068 + 2.363 \ln R + 2.248^* \ln P - 4.242 \ln U$$
$$(1.04) \qquad\qquad (2.61) \qquad\qquad (-1.02)$$

$$\bar{R}^2 = 0.83 \quad F(3,12) = 26.09 \quad \text{D.W.} = 1.76$$

Contrary to the real exchange rate, the real effective exchange rate was insignificant in explaining the export performance in manufactures. The same is true for the rate of capacity utilization (recession-boom effect) while the increase in manufacturing output had a significantly positive influence on manufactured exports.

The rather surprising result as regards the real effective exchange rate may be explained in different ways:

- First of all, the development of real and real effective exchange rates critically hinges on the calculation procedures and, in particular, on

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(1) Because of serious autocorrelation of the error term, the estimation technique used was the Cochrane-Orcutt iterative method (t-statistics in parentheses; * = significant at the 5 per cent level, two-tailed t-test).

the basket of foreign currencies included. This is evident from Tables A16 and A17, where alternative measures of real exchange rates are confronted with indices presented in previous studies.

- A second explanation as to why the real effective exchange rate proved to be insignificant in explaining Brazil's manufactured export performance may be seen in the highly uneven distribution of subsidies between different branches within the industrial sector. For example, both the export incentive scheme BEFIEX and export tax credit certificates were highly concentrated on a few sectors (for a more detailed analysis, see Section IV.3.c). Thus, contrary to the real exchange rate (which does not take subsidies into account), the real effective exchange rate does not affect the different branches of Brazil's industrial sector to the same extent. Moreover, the export subsidy measure does not reflect the *net* effect of Brazilian trade policies (on this issue, see again Section IV.3.c).

- Finally, the real effective exchange rate may not be found to be significantly correlated with manufactured exports because subsidies were mainly taken by firms already internationally competitive. Thus, subsidies may have resulted primarily in an increase in the profits of the benefiting firms and, in that way, would have been an ineffective and costly means (in terms of their budgetary and allocative implications) to promote exports. In this latter respect, however, the completely different export conditions in Brazil's major export markets must be taken into account. Thus, separate regressions should be run for the most important destinations of Brazilian manufactured exports to assess the impact of subsidies on export growth correctly. This is done in the following paragraphs.

γ. Some Determinants of the Manufactured Exports to Different Markets

The underlying data base of the following time-series regressions for Brazilian manufactured exports to various destinations covers the 1968-1981 period. The equation estimated for different export markets can be written as follows (1):

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(1) As in other studies, the small-country assumption is used, i.e., the exporting country faces a perfectly elastic demand curve. This seems adequate, as it has been shown that Brazil faces a highly, though

$$\ln X = a_0 + a_1 (\ln PXB + \ln EP) + a_2 \ln(1+s) + a_3 \ln U + a_4 \ln QM$$

where:

X   = Brazilian manufactured exports in constant US dollars (nominal value of exports in US dollars to each market deflated by the index of Brazilian manufactured export prices also in US dollars, as published by FGV [various issues], 1975=100);

PXB   = index of Brazilian manufactured export prices in US dollars;

EP   = (E/WP^B), where E is the index of the nominal exchange rate between the cruzeiro and the US dollar (item rf in IMF [b]) and WP^B is the wholesale price index for Brazil (item 63 in IMF [b]; 1975=100);

1+s   = export subsidies (see Table A17);

U   = recession-boom variable, proxied by the utilization of installed capacity in the Brazilian industrial sectors [FGV, various issues; IBGE, a];

QM   = index of Brazil's total manufactured output in real terms (1975= 100).

This equation presents the supply of exports as a function of the profitability of exports vis-à-vis the domestic market, also known as the real effective exchange rate for exporters. This variable is split between the real price of exports (PXB + EP) and export subsidies to determine the separate influence of both economic policies (i.e., exchange-rate policies and export subsidies) on export performance. The coefficients of both variables are expected to have a positive sign. The recession-boom variable captures the fact that in periods of slackening domestic demand local producers may try to sell more abroad to reduce idle capacity. Manufactured output is included to show that the higher overall output is, the higher exports are. This variable is supposed to capture the trend in exports; otherwise the parameters of the other variables would be seriously distorted.

This approach certainly has some limitations considering the major objective of the analysis, i.e., to identify differences in export determi-

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not perfectly, elastic demand for its manufactured exports. In an empirical study, it was found that price elasticities ranged between -2.2 and -7.6 in the long run [Braga, Markwald, 1983]. In addition, the correlation coefficient between the price indices for manufactured exports of Brazil on the one hand and that of the industrialized countries on the other turned out to be 0.93.

nants between Brazil's principal export markets. This would have requir-
ed a region-wise definition of the explanatory variables PXB (export
prices) and E (exchange rate). Moreover, it would have been more ap-
propriate to calculate the sector-specific indices of s (export subsidies),
U (recession-boom variable) and QM (total output) for major export mar-
kets as well, and to attach weights for the different sectors according to
their importance in Brazil's major export markets. However, data restric-
tions rendered this impossible so that a uniform definition of the explan-
atory variables had to be applied.

It is probably largely due to the aforementioned limitations that the re-
gression results presented in Table 13 only partly confirm our expecta-
tions. Both total output and the recession-boom variable proved to be
significant for all of Brazil's export markets. In all cases, coefficients
have the expected sign, i.e., positive for QM and negative for U. The
coefficient of the recession-boom variable is shown to be extremely high
for exports to the ALADI region. Moreover, the level of significance is
by far the highest in this case. This supports the hypothesis that Braz-
ilian exporters considered ALADI as their first export outlet at times of
sluggish demand in the domestic market. Special trading arrangements
among Latin American countries rendered it relatively easy to switch
from domestic markets to ALADI markets. Subsidiaries of multinational
companies located in Brazil but producing for the whole region could be
supposed to have made particular use of such preferences.

Export subsidies are found to be of importance in explaining the exports
of Brazilian manufactured goods as well. However, again interesting dif-
ferences exist, especially between Brazil's two most important export
markets, ALADI and the US. Subsidies were most relevant for exports to
the US, in terms of both size and significance of the regression coeffi-
cient. On the contrary, exports to ALADI were not significantly affected
by subsidies. Brazilian exports to ALADI largely consisted of machinery
and transport equipment, i.e., relatively capital-intensive goods. Al-
though such exports could principally be expected to require heavy sub-
sidies in order to be internationally competitive, it is hardly relevant in
the case of ALADI. Within the protected ALADI market, Brazil can be
assumed to be competitive in relatively capital-intensive productions since

Table 13 - Regression Results on Major Determinants of Brazilian Exports to Various Markets, 1968-1981 (a)

	Constant	(lnPxB+ lnEP)	ln(1+s)	lnU	lnQM	$\overline{R}^2$	SER	F	D.W.	Rho
World	25.0547 (3.3967)	−0.2923 (−0.4839)	2.9392 (1.7443)	−5.9109 (−3.9368)	2.2766 (5.0994)	0.87	0.1789	20.318	1.037	0.6872 [2]
ALADI	32.1036 (4.4701)	−0.2116 (−0.3397)	0.7930 (0.4662)	−7.7074 (−5.2676)	2.2496 (5.2105)	0.85	0.1833	17.3138	1.208	0.6113 [2]
USA	18.9330 (2.4669)	−0.1453 (−0.2119)	4.9319 (2.6593)	−4.9362 (−3.0810)	1.7914 (3.8867)	0.70	0.2014	7.5329	1.450	0.5684 [2]
Western Europe (EEC+EFTA)	18.8446 (2.2018)	−0.5802 (−0.6979)	3.8904 (1.7629)	−4.1519 (−2.3108)	2.0862 (4.0530)	0.58	0.2455	4.1728	1.687	0.4126 [2]
RofW(b)	19.4691 (1.9009)	−0.0631 (−0.0708)	4.5133 (1.8567)	−6.2334 (−2.9859)	2.8905 (4.6943)	0.51	0.2621	3.9380	1.272	0.6074 [3]

(a) For definition of variables and data source, see the text; t-values in parentheses beneath regression coefficients. The model was estimated through first-order serial correlation of the error maximum likelihood iterative technique. Number of iterations in square brackets next to the final value of Rho. − (b) RofW: Rest of World.

it is well advanced in terms of both physical and human capital endowment, compared to most other ALADI members.

However, the coefficients of (PXB + EP) turned out to be statistically insignificant for all export markets. There is a reason why this result cannot be interpreted as if the real exchange rate were not a relevant variable to foster export expansion: Brazilian authorities carried out an exchange-rate policy during much of the period considered in our estimations that resulted in relatively low real exchange-rate instability vis-à-vis the US dollar (1). This may be viewed as a necessary condition for the expansion of exports after decades of inward-oriented development. Statistically, however, the exchange-rate variable did not experience enough variability to be significant in our estimations.

c. Incentives to Exports and Import Protection

α. Net Incentives to Exports

Despite the hypothesis of policy-induced exports being substantiated by regression analysis in the preceding paragraphs, some questions still remain to be settled. Brazil's recent success in exporting rather capital-intensive products even to developed countries, for example, requires a closer look at economic policies affecting exports. Most importantly, export incentives must be considered at the sectoral level (in order to account for differences between various industries and, thus, allocation effects) and assessed on a net basis, i.e., adjusted for export-retarding effects of import protection. This could not be done in time-series analysis due to the lack of adequate data.

Both import and export policies have an impact on the export prospects of a country. Import-substitution policies are likely to affect the international competitiveness of potential exporters negatively. Government protection of import-substituting activities by import tariffs and non-

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(1) In the mid-1960s, Brazilian authorities implemented a passive crawling peg that closely followed a purchasing power parity rule. This system was largely maintained, sometimes interrupted by maxi-devaluations, as in 1979 and 1983, for example.

tariff trade barriers provides domestic suppliers with the opportunity to raise product prices beyond world market levels. In other words, national suppliers can successfully compete in domestic markets, despite their production costs exceeding the production costs of foreign producers. Import-substitution policies discriminate against potential exporters of the country because, in case of import tariffs, the price of imported inputs is artificially raised (as compared to unrestricted trade conditions), and imports are not available in sufficient amounts in the case of quantitative restrictions. If exporters have to replace imports by domestically-produced inputs, their international competitiveness is eroded because of relatively poor quality and/or higher prices of domestic supplies as compared to world market standards.

In order to compensate for direct cost disadvantages arising from import-substitution policies, exporting firms may be granted privileged access to imported inputs. The government may provide duty-free imports for exporters, establish so-called free activity zones, or refund tariff payments via drawback schemes. Income tax exemptions and other export subsidies may help to reduce the anti-export bias resulting from the artificially-increased prices of domestic inputs. To the extent that privileges for exporters compensate for the export-retarding effects of import restrictions, they merely establish a balanced structure of economic incentives granted to exporters and producers supplying the domestic market. Only if incentive rates granted to exporting firms exceed the level of import protection are the trade related policies of a country biased in favour of exports.

In Brazil's case, the net effect of export-promotion measures is difficult to assess, due to the variety and complexity of export incentives (for a detailed presentation of export incentives and methods of quantification, see World Bank [a, Ch. VI]). The Brazilian system of fiscal and financial incentives to manufactured exports was established during the years of economic liberalization in the mid-1960s and re-inforced later on. Export incentives have been used in a rather discretionary way to compensate for exchange-rate variations and to support specific industries. Fiscal incentives consisted of:

- the exemption of indirect taxes on exports;

- the drawback scheme which provided for the restitution of duties and taxes paid by exporters on imported production inputs;

- the reduction of corporate profit taxes for exporters;

- the BEFIEX scheme, established in 1972 as a system of enterprise-specific export-incentive packages based on long-term export commitments;

- the export tax credit scheme which was the most important subsidy to exports in the 1970s. Until 1979, the scheme was related to payments of sales taxes and its rates were generally identical to the sales tax rates for different products. The crédito prêmio was abolished as a general incentive in December 1979. When it was re-introduced early in 1981, the system was altered insofar as a uniform rate was set for all products, and the crédito prêmio could be used immediately for the payments of all tax obligations.

In addition to fiscal incentives, two programmes for the financing of manufactured exports were in operation. Under the FINEX programme (Fund for Export Financing), the foreign trade department of the Central Bank financed manufactured exports at subsidized rates in the pre-shipment and postshipment stages. The other main credit programme directed at manufactured export financing was the so-called Resolution 674. This programme "aimed at supplying working capital to the firms producing manufactured exports, but the operating procedures of this scheme, as well as the terms and conditions of the loans granted under the programme, place it closer to a cash subsidy financed through the monetary budget than to an export credit" [World Bank, a, p. 65].

Table 14 indicates considerable differences in fiscal and financial export incentives granted to various Brazilian manufacturing industries in 1980. Expressed as a percentage of export sales, export incentives were concentrated on textiles, clothing and footwear (30 per cent), i.e., traditional and labour-intensive export items on the one hand, and machinery and transport equipment (29-36 per cent) on the other. They were considerably lower for industries such as printing, tobacco, beverages, processed food, perfumery and chemicals (10-14 per cent).

In order to capture economic policy effects on the export performance of Brazil fully, a simultaneous look at import protection is required. Column (4) of Table 14 presents an estimate of implicit nominal protection in various industries based on direct price comparisons between domestic and world market prices as of late 1980 and early 1981 (1). When domestic prices are higher (lower) than foreign prices of the same product, domestic (overseas) sales by Brazilian producers are stimulated. The dispersion of import protection among industries was even wider than in the case of export incentives (2). The spectrum ranged from negative nominal protection - i.e., world prices exceeding domestic prices in Brazil - in paper and rubber products and non-metallic minerals, especially, to positive values of more than 90 per cent of domestic sales in pharmaceuticals and miscellaneous industries. The typical structure of protection in developing countries featuring the highest protection for consumer goods and the lowest for capital goods, found in previous studies as well as in Brazil's nominal legal tariff rates for the end of 1980, is completely reversed when calculating implicit nominal protection (capital goods: 37.8 per cent; intermediate products: 25.2 per cent; consumer goods: 13.1 per cent).

In some industries, high export incentives went along with low or even negative import protection. The most striking example in this respect was transport equipment. In many other cases, high export incentives were eroded by even higher incentives to domestic sales, however. For example, electrical equipment was granted export incentives as high as in transport equipment, but domestic prices were considerably above

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(1) Average implicit tariffs obtained from price comparisons between domestic and world market prices were adjusted for production subsidies to obtain the level of implicit nominal protection [for details, see World Bank, a, pp. 73 ff.]. The calculation of implicit tariffs (11.9 per cent for total manufacturing, on an average) revealed a remarkable degree of redundancy prevailing in the legal tariff structure.

(2) This is evident from Nunnenkamp and Fasano-Filho [1986, Table A14], where it is shown that nominal import tariffs experienced a substantial increase from 1973 to 1980. However, differences between industries were considerable: for example, the mark-up amounted to 7 and 18 percentage points for pharmaceuticals and machinery, respectively, but to more than 100 percentage points for perfumery and plastics.

Table 14 - Incentives to Exports and Domestic Sales in Brazil, 1980/81 (per cent)

Industry(a)	Export incentives			Implicit nominal protection	Anti-export bias	Exchange-rate adjusted			
	fiscal (1)	financial (2)	total (3)=(1)+(2)	(4)	(5)=(4)-(3)	export incentives(b) (6)	nominal protection(b) (7)	anti-export bias(b) (8)=(7)-(6)	effective incentives to domestic sales(b) (9)
Non-metallic minerals	4.0	10.1	14.1	-17.7	-31.8	-2.2	-29.5	-27.3	-31.1
Metallurgy	6.8	10.1	16.9	10.8	-6.1	0.2	-5.1	-5.3	15.0
Machinery	11.2	18.0	29.2	48.3	19.1	10.7	27.1	16.4	51.7
Electrical equipment	17.5	18.0	35.5	71.4	35.9	16.1	46.9	30.8	81.6
Transport equipment	22.7	11.4	34.1	-5.8	-39.9	14.9	-19.3	-34.2	-22.5
Wood products	7.8	11.4	19.2	-4.3	-23.5	2.1	-18.0	-20.1	0.9
Furniture	3.2	11.4	14.6	26.1	11.5	-1.8	8.1	9.9	30.8
Paper products	7.5	7.8	15.3	-16.1	-31.4	-1.2	-28.1	-26.9	-30.2
Rubber products	7.7	9.8	17.5	-15.4	-32.9	0.7	-27.5	-28.2	-32.6
Leather products	5.9	17.4	23.3	15.6	-7.7	5.6	-0.9	-6.5	-2.4
Chemicals	3.5	10.1	13.6	55.1	41.5	-2.6	32.9	35.5	59.7
Pharmaceuticals	8.5	10.1	18.6	97.4	78.8	1.6	63.2	67.6	85.3
Perfumes, soap	3.5	10.1	13.6	35.1	21.5	-2.6	15.8	18.4	64.2
Plastics	10.5	10.1	20.6	28.9	8.3	3.3	10.4	7.1	9.9
Textiles	8.1	21.5	29.6	25.2	-4.4	11.1	7.3	-3.8	17.1
Clothing, footwear	8.2	22.1	30.3	30.6	0.3	11.6	11.9	0.3	25.7
Processed food	3.7	10.1	13.8	-8.2	-22.0	-2.4	-21.3	-18.9	8.1
Beverages	3.3	10.1	13.4	-5.3	-18.7	-2.8	-18.9	-16.1	-15.3
Tobacco	0.2	10.1	10.3	1.3	-9.0	-5.5	-13.2	-7.7	-9.4
Printing	0.1	10.1	10.2	24.1	13.9	-5.6	6.3	11.9	13.0
Miscellaneous	4.0	10.1	14.1	91.8	77.7	-2.2	64.4	66.6	132.8
Total manufacturing	9.3	11.5	20.8	22.8	2.0	3.5	5.2	1.7	23.1

(a) Classification according to Instituto Brasileiro de Geografia e Estatística (IBGE); the definition of manufacturing is broader according to IBGE than in international statistics. - (b) In contrast to columns (1)-(5) where the comparison of incentives to exports and domestic sales is done at the prevailing exchange rate, adjusted measures take account of policy induced distortions in the exchange rate; in this latter case, the relevant world market prices are converted to cruzeiros at the exchange rate that would have prevailed if policy distortions had not existed.

Source: World Bank [a, Tables 36-38].

international levels in electrical equipment industries. Thus, the analysis of economic policies to exports should focus on the net effects of export promotion and import protection. The anti-export bias (if negative: pro-export bias) given in column (5) of Table 14 provides a measure of the relative incentive to sell in the export or domestic markets. The interpretation of this measure is as follows: Fiscal and financial incentives to exports averaged 20.8 per cent of the export value of total manufacturing, whereas implicit nominal protection applying to domestic sales of manufactured goods amounted to 22.8 per cent. Consequently, the price in cruzeiros received by an average Brazilian exporter was 2 per cent below the price of a domestically-sold good.

Though the anti-export bias was negligible at the global level of total manufacturing, domestic prices considerably exceeded export prices (including fiscal and financial incentives) in several industries in 1980. The anti-export bias was highest in pharmaceuticals (79 per cent), miscellaneous industries (78 per cent), chemicals (42 per cent) and electrical equipment (36 per cent). A reverse situation appeared in 11 out of the 21 industries listed, where export incentives exceeded import protection. Transport equipment experienced the highest relative bias in favour of exports, followed by rubber products, non-metallic minerals, and paper products. The dispersion of the anti-export bias among industries was as wide as implicit import protection and thus considerable policy- induced effects on the allocation of production factors among industries were to be expected. Rank correlation shows that no significant relationship existed between the absolute level of export incentives received by industries (column 3) and the anti-export bias (column 5); the Spearman correlation coefficient amounted to -0.05.

The measure indicating the policy incentives to exports may still be improved upon. In the preceding paragraphs, incentives to exports and domestic sales were calculated at the official exchange rate prevailing in 1980. However, these policies also affect the exchange rate. In order to make adjustments for the influences on domestic and overseas sales which stem from such a distorted exchange rate, export incentive rates and import protection have to be calculated on the basis of a shadow exchange rate which would have prevailed in the absence of policy inter-

ventions (1). The shadow exchange rate estimated by the World Bank for 1980 is shown to be 16.7 per cent above the actual rate, i.e., policy interventions resulted in an overvaluation of the cruzeiro.

Columns (6)-(8) in Table 14 present estimates of incentive rates by adjusting the figures in columns (3)-(5) for the aforementioned exchange-rate effects. When accounting for the overvaluation of the cruzeiro, both average export incentives and nominal protection granted to total manufacturing are considerably reduced, i.e., the incentives can be largely viewed as compensation for policy-induced distortions in the exchange rate. However, the wide dispersion of incentives among industries remains untouched. Moreover, the average anti-export bias does not change significantly. The changes in the anti-export bias at the industry level are also very small and the ranking of industries according to the adjusted anti-export bias is the same as above.

The measurement of policy effects on exports may be further improved if effective rather than nominal incentives to exports and domestic sales are compared. In the case of nominal incentives, the focus is on differences between the price for exports (including subsidies) and domestic sales received by Brazilian producers on the one hand and the world price on the other. However, effective incentives received depend not only on the price of the product but also on the prices paid for the inputs used in the production process. Effective incentive rates to domestic sales are presented in column (9) of Table 14. Attempts have also been made to estimate effective export promotion in Brazil [see, e.g., Tyler, 1981b], but they are subject to considerable limitations (2). The results obtained

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(1) The shadow exchange rate is defined as the rate that takes into account the impact of taxes, subsidies and other policy measures on the exchange rate but does not require the balance of payments to be in equilibrium. For alternative definitions of the shadow exchange rate and methods of calculation, see World Bank [a, p. 78, and Annex 2].

(2) In Tyler's estimations (presently not available to the public), BEFIEX and drawback incentives are excluded. Furthermore, the calculation of financial incentives is based on legal rates rather than actual amounts of financing. Export incentives received through reductions in the price of imported inputs under the BEFIEX and drawback schemes are taken into account in the nominal calculation,

are largely consistent with the estimates of nominal export incentives, both in terms of absolute amount and distribution among industries [World Bank, a, p. 87]. Thus, it seems adequate to refer to anti-export bias calculations based on nominal incentives in the following analysis.

β. Anti-Export Bias and Export Performance

At the global level of total manufacturing, it has been argued elsewhere (for a summary of major arguments, see Balassa [1979]), that the policy shift towards stronger world market orientation after 1964 appeared to be an important element in the improvement of Brazil's economic performance between 1968 and 1973. The reduction in import protection, the introduction of export incentive schemes, the simplification of administrative procedures and the publicly-stated policy of a stable real exchange rate were considered the major determinants of both high output and export growth in this period. After the first oil price shock, trade policy continued focusing on the expansion of manufactured exports, but the major thrust of economic policies returned to import-substitution policies. As has been shown before, however, net incentives to exports relative to domestic sales varied remarkably between different industries, and probably also between different enterprises or different types of enterprises.

The enormous dispersion of protection and export incentive rates among industries "goes well beyond what would be desirable on the basis of a limited number of well established priorities for industrial and export development" [World Bank, a, p. 89]. Policy measures included many discretionary elements and were not based on clearly-defined industrial policy priorities. This may have resulted in additional price distortions and inefficiencies due to the misallocation of production factors. The rather complex system of incentives probably gave rise to unintended side-effects or even contradictory policies. This may apply to the electrical equipment industry, for example, which received an extremely high level of import protection but was simultaneously granted top priority in export promotion.

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however. Only the differences in domestic prices of inputs produced in Brazil with respect to their world prices are not considered.

Some of the large differences in net incentives to exports may reflect Brazilian policy priorities, however. The striking reversal of the traditional structure of import protection, i.e., capital goods industries receiving the highest and consumer goods industries the lowest level of protection in 1980, may be attributed to infant industry arguments and the success of more traditional industries in achieving international competitiveness, for example. Notwithstanding the discretionary and contradictory policy elements, there is thus reason to raise the question where the major thrust of export promotion in Brazil was placed. It is most interesting to know whether the recent success in exporting rather capital-intensive products to other than the protected ALADI markets was related to an economic policy bias towards capital-intensive exports.

In previous studies, it has been shown that specific export incentives discriminated against labour-intensive industries. This applied to the export tax credit scheme, in particular [Pastore et al., 1978]. The following analysis explores the relationship between overall incentives to exports of various industries, relative to domestic sales, and factor intensities (1). The adjusted anti-export bias is considered as an incentive rate in the first place; factor absorption is for overall, human, and physical capital.

According to Table 15, export-promotion policies in Brazil seem to be somewhat biased towards rather capital-intensive productions. An adjusted negative anti-export bias (i.e., pro-export bias) went along with a relatively high value added per employee, i.e., overall capital intensity. The policy discrimination against labour-intensive industries seems to be relatively strong when industries with positive net incentive rates to exports are compared to industries where incentives to domestic sales exceeded export incentives. However, the differences in capital intensity

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(1) Factor intensities are those calculated in Table 10, i.e., on the basis of the ISIC categories, whereas information on incentives in Table 14 is according to IBGE industrial classification. Moreover, the comparison of factor intensities and incentive rates could be carried out on only 12 industries out of 21 sectors listed in Table 14, due to data limitations as regards factor intensities and reasons of comparison between ISIC and IBGE categories. Thus, the results present rather crude indications and should be interpreted with some caution.

Table 15 - The Relationship between Policy Incentives and Factor Inten-
sities in Brazilian Industries, 1980 (a)

	Incentive rate	Value added per employee	Wages per employee	Non-wage value added per employee
	per cent	US $ thousands		
Adjusted anti-export bias				
negative	-19.9	15.1 (5)	2.8 (4)	11.5 (4)
positive	13.8	12.2 (7)	2.9 (7)	9.3 (7)
Adjusted effective incentives to domestic sales				
negative	-21.9	16.0 (4)	3.0 (3)	12.2 (3)
low	10.2	12.3 (4)	2.7 (4)	9.6 (4)
high	47.5	12.0 (4)	3.0 (4)	9.1 (4)
(a) Unweighted averages. - Number of industries in parentheses.				

Source: See Tables 10 and 14.

among industries which received different degrees of positive effective
incentives to domestic sales were very small. Moreover, the bias of ex-
port promotion towards capital-intensive productions applied to physical
capital intensity only, whereas human capital intensity was largely the
same in industry groups of different protection levels.

Rank correlation analysis also indicates that policy-induced discrimination
against labour-intensive goods was not strong enough to be statistically
significant (Table A18). Relating overall and physical capital intensity to
the adjusted anti-export bias, correlation coefficients are negative, but
insignificant at the 10 per cent level of confidence. This is probably
partly due to the aforementioned inconsistencies in economic policies.
Moreover, Brazilian export promotion schemes, to a large degree, were
enterprise-specific rather than sector-specific. This particularly refers
to the BEFIEX scheme, which provided a specially-tailored system of
incentive packages based on the long-term export commitments of indi-
vidual firms. Consequently, policy discriminations may be significant at
the firm-level rather than between industries.

The inconsistencies in incentive policies towards exports and domestic sales as well as the enterprise-specific orientation of export promotion policies in Brazil seem to have weakened, though not completely eroded, the policy impact on export performance (1). In the late 1970s, all industries with positive anti-export bias were characterized by very low export ratios, with the exception of chemical products (2). However, the relationship between export incentives and the export performance of manufacturing industries of Brazil is shown to be rather weak when applying rank correlation analysis (Table 16). A positive relationship is revealed between total nominal export incentives on the one hand and export ratios in 1979 and the change in export ratios in 1970-1979 on the other, Spearman correlation coefficients are significant at the 10 per cent or lower level only if a rather narrow definition of manufacturing is applied, i.e., considering 15 industries out of the 21 industries of the IBGE classification. The impact of net incentives to exports relative to domestic sales on the degree of world market orientation of Brazilian industries remains insignificant as well, although all coefficients show the expected negative signs.

A significantly positive relationship between export incentives and export performance of Brazilian industries could not be established by cross-section analysis. This suggests that the analysis has to be disaggregated further. This need is also evident from the analysis presented by Tyler [1983], who calculated sectoral export growth rates in constant US dollar

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(1) The need to assess the net effect of economic policies at a disaggregated level is stressed by the development of import and export ratios (i.e., imports and exports relative to total domestic production) of various industries [Nunnenkamp, Fasano-Filho, 1986, Table A16]. Notwithstanding that both import and export ratios increased in most industries from 1963 to 1973, import substitution continued in some important industries, mechanical equipment and transport equipment representing the most remarkable cases in this respect. After 1973, import ratios declined for most of the industries, whereas export ratios increased further in most cases. But, again, there were notable exceptions: wood products, leather and pharmaceuticals as regards the former; wood products as well as clothing and footwear, in particular, as regards the latter.

(2) The increase in the export ratio of chemicals (1970: 5.7 per cent; 1979: 11.4 per cent) was largely due to the very large increase in exports of vegetable oils, most of which are classified under chemicals in the IBGE classification [World Bank, a, p. 84].

Table 16 - The Relationship between Policy Incentives (a) and Export Performance of Brazilian Industries: Rank Correlation Results (b)

	Fiscal export incentives	Financial export incentives	Total export incentives	Adjusted anti-export bias	Adjusted effective incentives to domestic sales
	export ratio (c), 1979				
All manufacturing industries(d)	0.15 (0.26)	0.23 (0.16)	0.19 (0.21)	-0.19 (0.20)	-0.10 (0.33)
15 manufacturing industries(e)	0.28 (0.16)	0.34 (0.11)	0.41 (0.06)	-0.26 (0.17)	-0.20 (0.24)
	change in export ratio, 1970-1979				
All manufacturing industries(d)	0.23 (0.15)	0.13 (0.29)	0.20 (0.19)	-0.17 (0.23)	-0.14 (0.27)
15 manufacturing industries(e)	0.39 (0.08)	0.16 (0.28)	0.39 (0.08)	-0.26 (0.17)	-0.23 (0.21)
	nominal export growth, 1974-1981				
12 manufacturing industries(f)	0.62 (0.02)	-0.24 (0.23)	0.21 (0.25)	-0.33 (0.15)	-0.41 (0.10)

(a) For the definition of incentive rates, see Table 14. - (b) The level of significance of Spearman correlation coefficients is in parentheses. - (c) Share of exports in total output of industries. - (d) All 21 industries listed in Table 14. - (e) The following out of the 21 industries were excluded: non-metallic minerals, metallurgy, processed food, beverages, tobacco and miscellaneous industries. The remaining list of industries refers to a narrower definition of manufacturing than the IBGE definition. - (f) On the basis of 12 manufacturing industries for which data on nominal export growth and incentive rates is roughly comparable, notwithstanding different industrial classifications in Tables A4 (SITC) and 14 (IBGE); non-metallic mineral products excluded.

Source: Tables 14 and A4; World Bank [a]; own calculations.

terms for the periods 1970-1974 and 1973-1977 on the one hand, and the changes in the nominal anti-export bias between 1973 and 1977 on the other, both for 58 Brazilian industries at the 3-digit IBGE sector classification. Regression analysis shows that, at this level of disaggregation,

the inter-industry variation in the changes in real export growth rates between the two periods were significantly related to changes in the anti-export bias. Though accounting for only 9 per cent of the inter-industry variance in the export growth changes, the regression coefficient is statistically significant at the 1 per cent level, indicating that, for each percentage point increase in the nominal anti-export bias, the real export growth rate fell by 8.5 per cent. Moreover, the relevance of net incentives to exports is underlined when looking at specific industries such as transport equipment on the one hand, and the electrical equipment industry on the other. For the former, characterized by the highest pro-export bias (Table 14), the share of exports in total output jumped from 0.7 per cent in 1970 to 10 per cent in 1979. The increase in export shares was considerably smaller with a strong anti-export bias in the case of electrical equipment (1970: 1.4 per cent; 1979: 4.4 per cent). Thus, it is appropriate to consider major characteristics of enterprises or different types of enterprises in explaining Brazil's export performance. This latter avenue is pursued in the subsequent paragraphs.

V. Export Performance at the Firm Level: Major Characteristics of Exporting Firms as Possible Determinants

1. The Relevance of Policy Discrimination

In the cross-section analysis of the preceding paragraphs, it was implicitly assumed that production patterns are homogeneous within Brazilian industries. However, the discussion of economic policies of the Brazilian government provided some indication of intra-industry differences that are likely to influence the export performance of Brazilian enterprises. If the direction and degree of export incentives varies not only between different industries, but also between different enterprises or different types of enterprise, the allocation of production factors within industries is affected by the government as well. At the enterprise level, policy measures may, for example, discriminate against relatively small producers, or favour foreign companies vis-à-vis domestic enterprises in order to attract foreign investors. Such biases in economic policies would artificially improve the international competitiveness of the privileged enterprises, both relative to other domestic firms and to foreign competitors, and create different export conditions for various types of enterprise within industries which are masked in cross-section analysis.

In addition to firm-specific policy interventions, the international competitiveness of enterprises may also be determined by other firm characteristics. Enterprises within specific industries may differ with respect to ownership, size and factor use, for example. This can be important in explaining Brazilian export performance, since such differences are likely to be related to the degree of world market orientation of firms:

- As regards ownership, the subsidiaries of multinational companies can be seen as the spearheads of export expansion in Brazil. Multinationals located in Brazil will strive to serve the whole ALADI region and also engage in intra-firm trade with their parent companies in developed countries. Due to strong technological and financial links to their parent companies, foreign-owned firms in Brazil are likely to have competitive advantages as compared to national Brazilian firms and to compete successfully in world markets.

- With respect to firm size, it can be hypothesized that, given the considerable fixed costs of entering overseas markets, the larger the firm is, the greater the probability of exporting is. With increasing size, such fixed costs can be spread over a larger volume of sales. Moreover, to stand the competition of foreign suppliers in world markets successfully, it may be of crucial importance to make use of economies of scale. Presumably, this is most relevant in the case of standardized product-cycle goods.

- The product-cycle hypothesis may be relevant in the context of enterprise-specific export performance and the firms' factor use as well. Whereas the traditional Heckscher-Ohlin theory of international trade predicts a negative relationship between capital-intensive production patterns of firms in developing countries and their export performance, the product-cycle hypothesis suggests comparative advantages to Third World suppliers operating at relatively high levels of physical-capital intensity, if the products they manufacture are standardized. In cross-section analysis, this hypothesis could not explain Brazil's export performance at the sectoral level; but it may well have some explanatory power at the enterprise level.

To subject these hypotheses to an empirical test, comprehensive firm-specific information on the characteristics of exporting and non-exporting Brazilian firms is required. Moreover, the competitiveness of Brazilian exporters has to be compared to the most important competitors of other countries. Only two major recently-published studies which follow a firm-specific approach explaining Brazilian export performance are known to us. The analysis presented by Silber [1983] is based on a total number of more than 19,000 firms, about 1,200 of which were exporting firms. His comparison of characteristics between exporting and non-exporting firms is largely restricted to four major industries (metallurgy, textiles, transport equipment, food) and data are for 1974 only. More recent data based on a total number of about 12,400 firms (exporters: 3,345) are presented in a study prepared by the ECLA office in Brazil [ECLA, 1985]. The information given there for 1978 is much broader, in terms of sectoral coverage, the number of relevant characteristical items analysed and the quality of data. Thus, the presentation in Section V.2. primarily relies on the latter source. In Section V.3., major results on export de-

terminants at the firm level achieved by logit and regression analysis are summarized. Finally, an outline for further research is drafted by referring to major questions left open by previous analyses. Due to data limitations, the net incentives granted by the Brazilian government to exports relative to domestic sales (anti-export bias) cannot be calculated for individual enterprises. However, some indications do exist that economic policies favoured relatively large enterprises. Indirectly, the administrative complexity of protection and incentive systems created such a bias, since "smaller firms ... do not have the resources to be fully informed of the complexities of the system, to process the applications for incentives and to find their way through the bureaucratic mechanisms" [World Bank, a, p. XII]. It is thus not surprising, that one of the main fiscal incentives to exports, the BEFIEX scheme, has mainly been used by a small number of large exporters. About 20 per cent of total manufactured exports during the 1978-1980 period were performed within BEFIEX, but only 59 enterprises maintained BEFIEX agreements until 1979 [World Bank, a, p. 58] (1).

The relationship between firm size and (fiscal) export subsidies is further accentuated by available information on 3,345 exporting firms [ECLA, 1985, pp. 26-28]. A total of 523 exporters received no fiscal incentive at all in 1978, i.e., neither income tax reductions nor export credits. In all industries but one (chemicals), unsubsidized exporters tended to be much smaller than subsidized exporters (size indicated by average sales). Moreover, rank correlation analysis reveals highly significant and positive Spearman coefficients between export volume (as a measure of average size of exporters) and the rate of export subsidies (relative to export revenues; compare Table 17). For all industries except non-ferrous metals, it is shown that the smaller the exporter, the smaller the export subsidy rate. Thus, it was mainly the international competitiveness of large enterprises which was artificially raised by export subsidies granted by the Brazilian government.

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(1) This number rose to 100 during 1980 and to 115 by July 1981. BEFIEX sectoral programmes were largely concentrated on transport equipment which accounted for nearly half of total export commitments in 1980.

Table 17 - Spearman Coefficients for Rank Correlations between Export Volume and Rate of Fiscal Export Subsidy (a) by Industry in Brazil, 1978

	Total fiscal export subsidies	Export credit	Income tax exemption
Non-metallic minerals	0.320**	0.249*	0.294**
Basic iron and steel	0.302**	0.229*	0.248**
Basic non-ferrous metals	-0.132	-0.176	0.071
Metal products	0.314**	0.312**	0.214**
Machinery	0.228**	0.239**	0.110*
Electrical equipment	0.232**	0.207**	0.149*
Transport equipment	0.338**	0.323**	0.223**
Wood products	0.178*	0.050	0.304**
Furniture	0.125	0.143	0.050
Paper products	0.332**	0.421**	-0.012
Rubber products	0.309*	0.243	0.397**
Leather products	0.343**	0.361**	0.221**
Chemicals	0.163*	0.149*	0.191**
Pharm., cosmetics	0.263*	0.236*	0.302**
Plastics	0.352**	0.301**	0.332**
Textiles	0.186**	0.149**	0.177**
Clothing	0.272**	0.227*	0.419**
Footwear	0.538**	0.377**	0.314**
Food, beverages, tobacco	0.117*	0.085	0.229**
Printing	0.481*	0.573*	0.114
Other manufactures	0.208*	0.162	0.233**
Total	0.202**	0.195**	0.176**

(a) Subsidy rates are defined as the ratio of subsidies to export revenues which include subsidies. Export volume is taken as an indicator of the size of exporting enterprises. - * ≙ Statistically significant at the 5 per cent level (two-tailed test); ** ≙ statistically significant at the 1 per cent level.

Source: ECLA [1985, p. 27, Table 7].

2. A Comparison of Exporting and Non-Exporting Firms in the Manufacturing Industry of Brazil

Biases in export promotion policies can be considered as one major reason why exporting firms show distinctly different characteristics as compared to non-exporting enterprises. Another reason may be that theoretical trade models simplify the rather complex reality, for example, by assuming perfect competition, constant returns to scale, and identical production functions for all firms within specific industries. Actually, various goods are produced at the sectoral level and most enterprises supply many different products. It is common to allocate each firm to the industry which accounts for the largest proportion of its total sales. It is not generally known to what extent a firm supplies products outside its main industry and, particularly, to what extent the industrial classification based on total sales truly reflects the distribution of sales in overseas markets. Consequently, homogeneity of firm characteristics within industries is rather unlikely to persist.

Characteristics of exporting enterprises may differ in various respects from non-exporting firms. Available firm-specific information for Brazilian enterprises allows comparisons as regards firm size, ownership, and factor absorption [ECLA, 1985; Silber, 1983]. The larger the firm, the greater the probability of exporting is, since fixed costs can be spread over a larger volume of total sales (for the case of Brazil, see also Tyler [1976, pp. 254-260]). Indeed, the percentage of Brazilian firms which exported in 1978 increased the larger the size. Allocating sample firms to different size classes, the percentage of exporters amounted to less than 1 per cent in the smallest size class, 4-26 per cent in the middle range and 62 per cent in the top group of enterprises with more than Cr $100 million in total sales (Table 18). The clear tendency that larger size increases the probability that a firm will export is present in each of the 21 industries.

However, once the decision to export has been taken, large firms tended to export a smaller proportion of their total sales than relatively small firms. In 19 out of 21 industries listed in Table 19, Spearman coefficients for correlations between the amount of domestic sales of Brazilian

Table 18 - Percentage of Exporting Firms by Size and Industry (a) in Brazil, 1978

	Size class							
	I	II	III	IV	V	VI	VII	VIII
Non-metallic minerals	0	0	4.0	14.3	19.0	23.2	31.7	48.7
Basic iron and steel	0	0	16.7	0	15.0	32.0	32.7	67.3
Basic non-ferrous metals	0	0	0	0	6.9	6.7	36.7	54.5
Metal products	0.9	3.4	7.7	4.0	11.0	17.8	40.7	61.9
Machinery	2.0	4.0	6.2	15.3	28.3	41.5	57.6	84.0
Electrical equipment	0	6.3	5.9	5.0	21.0	28.9	55.6	74.2
Transport equipment	0	20.0	7.7	8.3	38.2	38.0	42.9	76.6
Wood products	0	4.8	4.0	3.9	14.0	28.6	52.3	71.2
Furniture	2.7	0	5.9	2.8	2.5	21.0	35.2	61.0
Paper products	0.7	0	0	1.4	6.9	12.0	25.8	49.5
Rubber products	0	0	2.9	6.8	13.0	30.6	29.4	74.2
Leather products	0.5	1.3	6.9	21.4	20.6	56.4	92.1	94.1
Chemicals	12.5	23.1	10.5	8.3	15.4	16.9	40.0	52.6
Pharm., cosmetics	0	1.0	2.7	5.3	6.5	17.2	27.1	53.3
Plastics	0	0	11.1	9.7	10.5	11.6	23.5	54.8
Textiles	0	0	5.0	13.3	12.4	26.8	48.4	74.9
Clothing	0	8.0	2.0	6.2	10.6	20.9	27.8	47.7
Footwear	0	0	8.3	25.0	36.2	64.5	69.4	81.1
Food, beverages, tobacco	0.8	0	2.2	4.3	12.9	12.5	20.5	44.3
Printing	0	0	0	0	4.7	0	4.3	35.1
Other manufactures	0	0	10.0	12.5	31.1	39.5	48.5	75.0
Total	0.6	2.1	4.2	7.4	14.9	25.9	39.8	61.9

(a) Size classes in terms of domestic sales are defined as follows:
    I   Less than Cr $2 million;   V Cr $12-25 million;
   II Cr $2-4 million;   VI Cr $25-50 million;
 III Cr $4-8 million;   VII Cr $50-100 million;
  IV Cr $8-12 million;   VIII More than Cr $100 million.

Source: ECLA [1985, p. 23, Table 4].

exporting firms and export ratios are negative, 10 of which are significant at the 5 per cent level or lower. This pattern may be explained as follows: a minimum size may be required to become competitive in international markets at all; but once a firm has decided to export and has

Table 19 - Spearman Coefficients for Rank Correlations between Firm Size
and Export Performance by Industry (a) in Brazil, 1978

Industry		Industry	
Non-metallic minerals	-0.189	Chemicals	-0.524**
Basic iron and steel	-0.191*	Pharm., cosmetics	-0.157
Basic non-ferrous metals	-0.161	Plastics	-0.131
Metal products	-0.061	Textiles	-0.174**
Machinery	-0.018	Clothing	-0.219*
Electrical equipment	-0.016	Footwear	-0.671**
Transport equipment	0.171*	Food, beverages, tobacco	-0.461**
Wood products	-0.440**		
Furniture	-0.233*	Printing	0.071
Paper products	-0.143	Other manufactures	-0.200*
Rubber products	-0.081	Total	-0.232**
Leather products	-0.186*		

(a) Rank correlation is based on a total number of 3,345 Brazilian
exporters. Firm size measured by domestic sales, export performance by
export ratios, i.e., exports relative to total sales. - * ≙ Statisti-
cally significant at the 5 per cent level; ** ≙ statistically signifi-
cant at the 1 per cent level.

Source: ECLA [1985, p. 25, Table 6].

incurred the fixed costs of entering overseas markets, exporters oper-
ating in relatively narrow domestic markets have the most to gain from
exports as regards cost reductions by making use of scale economies
[Glejser et al., 1980; Teitel, Thoumi, 1986].

Within the group of large enterprises operating in Brazil, the subsid-
iaries of multinational corporations figured prominently. Multinationals
were concentrated in the most modern and dynamic manufacturing indus-
tries, such as mechanical and electrical equipment, transport equipment,
plastics and pharmaceuticals (Table A19). Thus, multinationals can be
expected to be the spearheads of Brazilian exports as well.

Actually, the exports of subsidiaries of foreign enterprises accounted for
about 40 per cent of total Brazilian manufactured exports in 1967 and

almost all exports of electrical equipment, transport equipment, plastics and pharmaceuticals. In 1978, the share of multinationals in total manufactured exports of Brazil again amounted to almost 40 per cent, notwithstanding some changes in various industries (Table A20). The export share of foreign-owned firms exceeded their share in total domestic sales of manufacturing industries (33 per cent) by 6 percentage points. In all but 7 of the 21 industries, export participation of multinationals was higher than participation in domestic sales.

Multinationals appear to have received higher export incentives than national firms in Brazil. Nearly half of subsidized export credits were granted to foreign-owned firms whereas their share in Brazil's manufactured exports was only 39 per cent. As far as export subsidies provided by income tax exemption were concerned, the share granted to multinationals was slightly below their export share. However, the former result may be largely due to the aforementioned bias in export promotion policies towards larger enterprises rather than outright privileges granted to multinationals.

In most Brazilian industries, foreign-owned enterprises accounted for a considerably larger share in value added than in employment (total manufacturing: 36 per cent and 26 per cent respectively). The tendency towards relatively capital-intensive production by multinationals in Brazil is probably due to various reasons. The bias in Brazilian export promotion particularly in favour of large enterprises may be of some relevance. Large enterprises (most of the Brazilian subsidiaries of multinationals belong to this category) are generally known to use rather capital and skill-intensive techniques compared to smaller firms. Moreover, multinationals figured most prominently in rather capital-intensive industries, such as electrical equipment, transport equipment and rubber products (Tables 10 and A19). Due to strong ties to their parent companies in developed economies, the relatively poor endowment of Brazil as regards human skills and, though to a lesser extent, physical capital did not constrain the multinationals' choice of production techniques as much as it might have for national producers.

Permanent inflows of technical know-how and physical capital associated with the operations of multinationals in Brazil may have induced more capital-intensive exports. Most interestingly, in 1974 the share of exports to LAFTA (which can be considered as relatively capital-intensive) in total exports was more than twice as high for multinationals than for domestic firms [Silber, 1983, p. 91]. But also the capital intensity of exports by national firms was likely to be affected positively by the multinationals' operations in Brazil. Domestic producers probably made use of the know-how embodied in products supplied by foreign-owned enterprises.

The comparison of factor intensities between exporting and non-exporting Brazilian enterprises in Table A21 is based on the Lary concept (for an explanation, see Section IV.2). Estimates of overall, physical and human-capital intensities are presented, measured by value added per employee, non-wage value added per employee, and wages per employee, respectively. Exporters clearly applied more capital-intensive techniques than non-exporters. With only one exception (footwear), both physical and human- capital intensity were higher for exporting enterprises. However, it cannot be concluded that higher capital intensity necessarily had a positive impact on the probability of exporting: "firms that export may be relatively capital-intensive not by virtue of the fact that they sell part of their output to foreign markets, but rather because they are large" [ECLA, 1985, pp. 31-32]. The correlation coefficient between size and overall capital intensity is significantly positive (0.46).

Differences in capital intensity between exporting and non-exporting firms are, in effect, considerably narrowed if comparisons are normalized by size. This can be done on the basis of data on electricity consumption and average wages in four Brazilian industries presented by Silber [1983, Tables 14, 16, and the statistical appendix to Ch. 4] (1). According to Table A22, exporting sample firms, on average, consumed about twice as much electricity per employee and paid considerably high-

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(1) In contrast to the Lary measures presented above, Silber considers consumption of electricity per employee as an indicator of physical-capital intensity and average wages paid as an indicator of human-capital intensity.

er wages than non-exporting firms (1). However, the picture changes drastically when exporters and non-exporters of similar size are compared. For the four selected manufacturing industries as a whole, the differences in both measures are significantly reduced. Exporters in transport equipment industries consumed less rather than more electricity than non-exporters, when the comparison is normalized by size. Wage differentials in this industry drop from 89 per cent to less than 20 per cent in the most important size classes. In textiles, the reduction in wage differentials is somewhat smaller; figures on electricity consumption in the three lower size groups (which include more than 75 per cent of both textile exporters and non-exporters) indicate that physical capital intensity was only marginally higher or even lower (101-200 employees) for exporters.

3. Regression Results and Open Questions

The results presented above confirm that an isolated comparison of capital intensity in exporting and non-exporting enterprises is misleading. To determine the independent effect of capital intensity and other variables on the probability of exporting and on export performance requires a multivariate approach. As regards the probability of exporting, logit analysis has been applied where Y_i is a dichotomous variable (which takes the value of 1 if firm i exports and 0 if it does not) and P_i stands for the estimated probabilities (0-1 interval). (For a detailed presentation ECLA [1985, Ch. IV].)

$$Y_i = P_i + u_i$$

$$P_i = 1/(1+e^{-Zi})$$

$$Z_i = b_0 + b_1 \ln S_i + b_2 \ln K_i + b_3 ADV_i + b_4 STATE_i + b_5 LIC_i + b_6 FoR_i$$

(1) The figures must be interpreted with some caution, however, since the way of calculation remains somewhat dubious in the source; see also the note to Table A22.

where:

ln S: firm size as measured by the natural logarithm of sales;

ln K: capital intensity, defined as the natural logarithm of value
         added per employee; K is split into HK and PHK, i.e., human
         and physical capital intensity, measured according to the Lary
         concept;

ADV: ratio of advertising expenditures to domestic sales;

STATE: dummy variable, which equals 1 if the government holds equity
         in the firm, and 0 otherwise (1);

LIC: dummy variable, which equals 1 if a national Brazilian firm has
         a licensing agreement with a foreign firm, and 0 otherwise (1);

FoR: dummy variable, which equals 1 if foreigners hold more than
         10 per cent of the equity of a firm, and 0 otherwise (1).

Estimation of the logit model for all sample firms reveals the following re-
gression coefficients, all of which except STATE are significant at the
1 per cent level of confidence (STATE: 5 per cent level; for industry-
specific results, see ECLA [1985, p.36]):

(i) $Z = -12.6 + 0.90 \ln S - 0.35 \ln K + 5.2 \, ADV$
           $- 1.4 \, STATE + 0.58 \, LIC + 0.94 \, FoR$

(ii) $Z = -13.5 + 0.88 \ln S - 0.19 \ln HK - 0.09 \ln PHK$
           $+ 5.0 \, ADV - 1.4 \, STATE + 0.58 \, LIC + 0.93 \, FoR$

The most interesting findings are the following:

- The coefficient of the size variable (ln S) is positive. A 10 per cent
  increase in firm size was associated with a 9 per cent increase in the
  odds of exporting. In all industry-specific regressions, the size var-
  iable is significantly positive as well.

- The coefficient of ln K, i.e., overall capital intensity is negative as
  suggested by the standard theory of international trade. The probabil-
  ity of exporting increased for enterprises applying rather labour-in-
  tensive techniques. This result holds true for 19 out of 21 industry-
  specific regressions as well, but only 9 coefficients are significant at

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(1) In industry-specific estimates, LIC and FoR are combined to LICFoR,
    and STATE is deleted due to an insufficient number of public enter-
    prises in the sample [ECLA, 1985, p. 36].

the 5 per cent level. Both physical and human capital intensity were negatively related to the probability of exporting. However, the considerably larger value of the coefficient of HK indicates that variations in human capital intensity had a much greater impact on the probability of exporting than did variations in physical capital intensity. This provides some support to the product-cycle hypothesis.

- Public enterprises were less likely to export than privately-owned firms, as indicated by the negative coefficient of STATE. In contrast, foreign participation, both in the form of direct investment and licensing, increased the probability of exporting. This is in line with expectations that multinationals operating in Brazil were the spearheads of exporting.

In a second step, regression analysis was applied in order to address the question as to what determines the allocation of output between domestic and overseas sales, once the decision to export has been taken (1). Export intensity is measured by the ratio of exports to domestic sales. Major results can be summarized as follows:

- In accordance with rank correlations presented in Table 19, regression analysis shows that large firms in terms of domestic sales tended to export a relatively small proportion of their output.

- In contrast to export-probability results, export ratios increased with higher (overall) capital intensity. However, the significance of the coefficient of ln K is solely attributable to variations in physical capital, whereas the human capital variable is not significantly different from zero (2). The positive impact of physical capital intensity on export ratios may be explained as follows: "A firm with a large investment in plant and equipment requires a larger volume of exports to

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(1) Thus, in contrast to logit analysis, the regressions are based on data for exporting firms (3,345) exclusively. In addition to the independent variables considered in logit analysis, some additional variables entered regression analysis. For details, see ECLA [1985, Ch. V].

(2) In contrast, Silber [1983, pp. 104-106] found the skill factor to be significantly positive and physical capital intensity positive but insignificant. However, the Lary measure applied by ECLA is clearly superior to consumption of electricity which was taken by Silber as a measure of physical capital intensity.

reduce average costs to a minimum than does a firm with the same volume of domestic sales but less capital-intensive production techniques" [ECLA, 1985, p. 46].

- Economic-policy variables generally show the expected signs: higher implicit tariff protection was associated with lower export ratios. The presence of export subsidies improved export performance, although the results are somewhat ambiguous as regards variations in subsidy rates granted by the export tax credit scheme. The drawback scheme which provided for duty-free imports was most valuable for exporters relying heavily on foreign suppliers of inputs. This may explain why export performance was found to be relatively poor for more vertically integrated Brazilian firms. The latter result may also indicate an important bottleneck for future export growth of Brazilian enterprises. If Brazilian exporters are required to buy most of their inputs from national sources and if domestic suppliers are less efficient in terms of product prices and product quality as compared to world markets, the international competitiveness of Brazilian exporters is likely to be affected negatively.

- With regard to ownership characteristics, foreign participation in the form of both direct investment and licensing had a positive impact on export performance (1). The same was true for state ownership; the latter result may be rather arbitrary, however, since only eight sample exporters were public enterprises.

The results presented in the preceding paragraphs underline the relevance of a fairly disaggregated analysis in order to identify the major determinants of Brazilian export performance in the past and to evaluate the future export prospects of this country. The question of relative efficiency of different types of enterprise and the relevance of scale economies in achieving competitiveness in world markets can be accurately dealt with in the context of in-depth studies on specific industries only. An interesting case in point is the Brazilian automobile industry which became increasingly efficient as it expanded [World Bank, a,

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(1) This result conflicts with the findings of Silber [1983, pp. 104-106] who concluded that export ratios were scaled-down by the presence of multinationals.

pp. 116-125]. In the early 1980s, the prices of Brazilian vehicles were considerably below those of similar foreign vehicles. To some extent, this may be traced to lower prices for iron and steel inputs, compared to international standards. Moreover, car prices in Brazil fell relative to the general Brazilian price index, and some evidence suggests that this decline was closely linked with economies of scale. On the other hand, however, some material costs have been considerably higher than in the competing countries and automobile prices are controlled by the govern-ment. Thus, whether the automobile industry is likely to be found at the forefront of Brazilian-manufactured exports in the future can only be judged from a more detailed sector study.

The automobile industry also represents an interesting example of tech-nological development based on foreign companies. It has been shown that subsidiaries of multinational corporations in Brazil played a major role in exporting manufactured goods. It is rather unlikely that this can only be attributed to the greater export incentives granted to them and economies of scale due to size. International competitiveness might have been improved by greater efficiency among the local suppliers of parts and components. Foreign automobile producers successfully developed their local suppliers by providing finance, training and technical assist-ance. In this way, technological development in backward industries was stimulated by the operations of foreign enterprises. Consequently, fa-vourable export prospects are likely to exist in industries with direct foreign participation and in sectors that indirectly derive benefit from foreign enterprises' operations, provided that the Brazilian government continues to welcome technology transfers via foreign direct investment in the future.

Because of considerable differences between Brazilian industries, both in terms of export performance and economic incentives, further research should be concentrated on specific industries and their position in the international division of labour. Measures have to be applied which indi-cate the net policy incentives to exports. Net effective incentive rates to exports and domestic sales would be best suited in this respect, insofar as they embrace the effects of both import protection and export promo-tion and consider exchange-rate effects as well. This would help to cla-

rify the discussion on the effectiveness of economic incentives in Brazil, which is characterized by alternative hypotheses. It was argued that a reduction in the anti-export bias would induce Brazilian industries to operate at efficiency levels closer to international standards [see, for example, Tyler, 1983]. In other studies, the view has been expressed that Brazilian industries have achieved a high degree of competitiveness in spite of anti-export biases in economic policies [see, e.g., Teitel, Thoumi, 1986]. As regards consumer goods industries, the World Bank [a, p. 77] concluded: "With a very large domestic market, fast growing domestic demand, increasing exports, and generally small minimum efficient size plants, the lack of foreign competition resulting from high tariff and non-tariff barriers was apparently compensated by a considerable degree of domestic competition".

However, the question of improved international competitiveness as a result of larger production runs made possible by fast-growing domestic markets and/or policy incentives to exports should be addressed at a more disaggregated level. This is because economic incentive rates varied drastically between industries as well as between different types of enterprise.

VI. Recent Policy Changes and Trends in World Trade

1. Trade Policies and New Trade Arrangements

After the big jump of total exports between 1979 and 1980, exports again
increased substantially by 33.9 per cent between 1982 and 1984 and fell
only 5 per cent in 1985 (Table A2). In 1984, the share of exports in
GDP reached an historical peak of 12.8 per cent. This relatively high
level could, however, not be sustained in the following two years. In
1986, the export/GDP ratio fell to the 1980 level (8.5 per cent). Manu-
factured goods exports improved their share in total exports from 51.0
per cent (1981) to 54.9 per cent in 1985 according to the preliminary
statistics available (1).

Major changes in the commodity structure of Brazil's manufactured ex-
ports in the early 1980s were in the decline in shares of transport
equipment, non-electric machinery and processed food and beverages,
and in the increase in their shares in steel and chemical products, and
shoes (Table 20). However, the most recent information on Brazilian
manufactured exports classified by different product categories is not
further disaggregated by different export destinations, as is the case of
the international sources for the 1960s and 1970s, analysed in the pre-
ceeding chapters. Only total trade is differentiated by region. According
to preliminary figures for 1985, the earlier trend of rising ALADI export
shares was reversed in the early 1980s (Table 21). The US market in
particular regained its importance, displacing the ALADI as the most
important single buyer: with the beginning of widespread debt crises,
prospects for exports to the Latin American region were deeply eroded,
whereas the US entered an expansionary phase with import demand
booming. Obviously, Brazil successfully managed to switch to the more
promising US market after 1981 in order to compensate for the slow-down
in trade with ALADI, as the country had succeeded in shifting manufac-

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(1) These figures refer to the national defintions of manufactured goods
    and are not comparable to the figures otherwise cited in this study,
    which refer to the definitions of international organizations.

Table 20 - Commodity Structure of Brazil's Manufactured Exports, 1981-
1985 (per cent)

	1981	1983	1985(p)
Processed food, beverages, tobacco	14.9	15.2	12.6
Organical chemicals	3.6	4.5	4.6
Plastics	1.6	2.5	2.8
Other chemicals	0.6	0.6	0.6
Wood products	1.6	1.4	1.0
Paper products	1.8	1.8	1.9
Textiles, clothing	3.8	4.0	3.1
Steel products	6.7	11.1	12.4
Machinery, non-electric(a)	13.0	9.7	11.2
Electrical equipment	4.7	3.9	4.1
Transport equipment	17.5	12.8	12.0
Footwear(b)	4.9	6.3	6.9
Other manufactures	27.2	28.2	28.2
Total(c)	100.0	100.0	100.0

(a) Includes machine tools and mechanical instruments. - (b) Includes
parts and components. - (c) The total may not be exactly 100, due to
the rounding-off of figures. - (p) Preliminary.

Source: FUNCEX [1986]; own calculations.

tured exports in the opposite direction after 1973. This indicates a re-
markable flexibility on the part of Brazilian exporters, considering that
export conditions and the structure of demand for Brazilian products
differed significantly between both markets.

Three major developments contributed to the export boom in the 1983-
1985 period. Firstly, the 30 per cent devaluation of the cruzeiro in
February 1983 strengthened the competitive position of Brazilian goods
in the world markets, which had been eroding over the previous two
years. Subsequent and continuous small devaluations, roughly in line
with domestic inflation, sustained this real depreciation. Secondly, de-
pressed domestic market conditions, reflecting the recession, also made
export sales more attractive to industrial producers, thereby stimulating
exports. Thirdly, the strong performance of the US economy provided
scope for Brazil's export growth.

Table 21 - Direction of Brazil's Total Exports, 1982 and 1984 (per cent)

Destination country(a)	1982	1984
US	20.0	28.5
Japan	6.4	5.6
EEC	27.0	22.8
Other European countries	5.0	5.3
Other industrialized countries	2.4	2.8
ALADI	14.2	10.5
Middle East	6.1	5.4
Asia	4.7	6.0
Africa	5.6	5.9
Centrally-planned economies	5.9	5.0
Others	1.6	1.0
Total(b)	100.0	100.0

(a) The information on the group "oil-exporting countries" as in Table 5 is not given separately in the source, therefore figures for the Middle East, Asia, and Africa differ from those in that table.- (b) The total may not be exactly 100, due to the rounding-off of figures.

Source: IBGE [a]; own calculations.

Manufactured exports continued to be promoted by the system of fiscal export incentives, which, while largely unchanged up to 1984, sustained the profitability of producing goods for export during the recession. The key element of that system was the export tax credit, which, in 1983, was paid as an ad valorem rate of 11 per cent but was scheduled for elimination by April 1985. The availability of export financing for both sales and production has been decreasing, as a consequence of the general monetary austerity. An additional export incentive, however, was provided by drawback system reforms in mid-1983, under which intermediate inputs used for exports could be freely imported.

The benefits of the February 1983 devaluation to exporters of most agricultural, livestock, forestry, and mineral products were reduced by the imposition of commodity export taxes ranging from 10 to 20 per cent. Most of these taxes were subsequently reduced and eliminated by April 1984, although most primary-product exports continue to be subject to a de facto export tax due to the impossibility to rebate the ICM from such products when exported. Product-specific export taxes have also been

used in the effort to avoid countervailing duties on some steel and other manufactured products, considered to be subsidized primarily by the United States and the European Community.

In the early 1980s, the Brazilian industry continued to be well protected against international competition. In 1985 the effective rate of protection for the total manufacturing industry was 39.0 per cent, while the agricultural sector yielded a negative protection rate of -16.4 per cent (Table 22). Since the cruzeiro was much more overvalued against major currencies in 1980/81 than in 1985, a comparison with the average rate of protection at the beginning of the 1980s would certainly indicate an increasing protection for the domestic industry. The comparison also shows, that the structure of protection among industries has a greater variability of protection rates, varying between 802.5 per cent for textiles and -135.0 per cent for processed food.

Efforts to restructure and expand the framework of ALADI have been intensified in the course of the economic crises in many member countries since the early 1980s. The political changes in Brazil and Argentina have also given a new prospect to further advancements towards a Common Market in Latin America, with emphasis on bilateral trade concessions. In August 1986, both countries signed an agreement to speed up trade in the region (1). Besides two documents covering Brazilian imports of wheat and common projects in the food industry, a third document arranges the renegotiation of the Partial Trade Agreement signed with ALADI which constitutes the core of the contract. This latter agreement intends to eliminate all tariff and non-tariff restrictions on the common list of items of both countries. It proposes an overall level of bilateral trade in capital goods of US $2.0 billion for the next four years and further stipulates that, by 1990, the common list will cover at least 50 per cent of the whole spectrum of capital goods traded between the two countries; in all purchases of the public sector, imports directly or indirectly originating from Argentina and Brazil, will be treated as domestic ones. The fact that the list of capital goods which will be affected

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(1) The total coverage of the agreement is embodied in 12 protocols, dealing also with other fields of cooperation [see Brasil-Argentina, 1986, pp. 63-70].

Table 22 - Effective Protection Estimates at the 2-Digit Level for Brazilian Industries, 1980-1981 and 1985 (per cent)

Industry	1980-1981	1985
Mining	-4.3	-10.6
Non-metallic minerals	-19.6	9.2
Metallurgy	34.2	52.1
Machinery	77.0	5.6
Electrical equipment	111.9	50.6
Transport equipment	-9.6	-6.1
Wood products	17.7	30.9
Furniture	52.7	51.7
Paper products	-18.5	43.0
Rubber products	-21.4	39.7
Leather products	13.9	29.1
Chemicals	86.4	57.4
Pharmaceuticals	116.3	116.7
Perfumes, soap	91.6	25.7
Plastics	28.3	187.2
Textiles	36.7	802.5
Clothing, footwear	46.7	262.9
Processed food	26.1	-135.0
Beverages	-1.1	-6.4
Tobacco	5.7	-80.0
Printing	31.9	-2.5
Miscellaneous	171.7	92.2
Total manufacturing	43.6	39.0
For comparison:		
Agriculture	-8.2	-16.4

Source: World Bank [a, Table 33]; Braga [1986, Table 2].

by the contract was still to be agreed upon when the agreement was signed makes an analysis of the impact on Brazil's future trade flows very difficult. However, besides the problems usually associated with the implementation of such integration plans, it can be expected that trade will be rather re-directed from other Latin American countries towards Argentina without opening trade channels for new products.

2. The Episode of the Cruzado-Plan

The importance of a stable domestic economic environment for maintaining favourable export conditions can be impressively demonstrated by an

evaluation of the recent Brazilian stabilization experiment, which was ini-
tiated by the government on February 28, 1986 when the Cruzado-Plan
was implemented. Economic reform could no longer be postponed when
the official inflation rate accelerated to 14.4 per cent per month in Feb-
ruary and especially food prices had risen above the average (17.6 per
cent). On an annual base, the change of the consumer price index would
have amounted to approximately 500 per cent (a change against the past
year of 225 per cent) and brought the economy close to hyper-inflation.
In order to fight inflation a new currency, the "Cruzado" (Cz $), was
created, most of the prices of goods and services were frozen and the
widespread indexation was mostly abolished.

The prospects of the programme were not bright from the beginning (1).
The stabilization measures were designed to cure the symptoms but not
the cause of the accelerated inflation. This is especially true with res-
pect to the price freeze, which usually suppresses inflationary press-
ures, hinders investment to ease supply bottlenecks, and freezes fund-
amental imbalances in the economy. A serious cure of the inflationary
process would also have asked for sacrifices from the state. As historical
examples demonstrate, hyperinflation can only be successfully ended by
a currency reform if two conditions are fulfilled: firstly, a drastic re-
duction in the deficit of the public sector, and secondly, the establish-
ment of an autonomous monetary authority with a monetary policy which
is independent of the financing needs of the government and strictly
oriented towards the stability of the new currency (2). However, none
of these conditions was realized in the Brazilian reform package.

The stabilization programme had serious consequences for the export
performance of the Brazilian economy. The hitherto-practised system of
mini-devaluations was abolished and the exchange rate of the cruzado
against the US dollar was frozen at the level of Cz $13.84 for an un-
determined period. Despite strict price controls, a zero inflation rate
could not be achieved (Table 23) and hence the global competitiveness of
Brazilian goods on the world markets deteriorated in the course of the

(1) For a critical evaluation of the Cruzado-Plan, see Fischer [1986].
(2) For Germany's experience with currency reform, see Lutz [1943],
    Wallich [1955], and Vaubel [1983].

Table 23 - Basic Trade-Related Indicators in Brazil, 1986 and 1987 (monthly data)

Year/month	Consumer price index(a)	Nominal exchange rate	Real effective exchange rate	Parallel-market(b)	Exports	Imports	Trade balance
	per cent	Cz $/ US $	1980-1982 = 100	per cent	US $ billion		
1986							
January	16.23	12.13	n.a.	30.4	1.91	1.20	0.71
February	14.36	13.72	n.a.	38.7	1.75	1.03	0.72
March	-0.11	13.81	75.2	40.9	2.16	1.01	1.15
April	0.78	13.81	73.6	46.0	2.17	0.89	1.28
May	1.40	13.81	72.8	50.3	2.29	1.03	1.26
June	1.27	13.81	73.1	51.0	2.00	0.92	1.08
July	1.19	13.81	72.1	72.0	2.21	1.20	1.01
August	1.68	13.81	72.1	66.2	2.10	1.08	1.02
September	1.72	13.81	72.4	74.1	1.86	1.02	0.84
October	1.90	14.06	71.6	102.3	1.34	1.13	0.21
November	3.29	14.16	73.0	100.8	1.28	1.15	0.13
December	7.27	14.86	76.1	83.2	1.33	1.17	0.16
1987 (p)							
January	16.82	16.50	75.9	64.5	1.26	1.30	-0.04
February	13.94	19.76	71.4	50.0	1.45	1.13	0.32
March	14.40	22.09	71.3	n.a.	1.43	1.13	0.30
April	20.96	25.37	74.2	n.a.	1.67	1.17	0.50
May	23.21	33.91	72.3	n.a.	2.18	1.23	0.95
June	26.06	43.27	71.9	n.a.	2.64	1.21	1.43
July	3.05	45.91	n.a.	n.a.	2.89	1.46	1.43

(a) Change in official index against previous month. - (b) Agio over official exchange rate. - (p) Preliminary figures.

Source: Morgan Guaranty Trust Company [1987]; Suma Economica [various issues].

year. The agio on the official exchange rate on the parallel market for the US dollar's amounting to over 100 per cent in October 1986 might be seen as a very rough indicator of the increasing overvaluation of the currency. In addition to the overvaluation of the Brazilian currency, further difficulties for exports arose from various supply shortages in the domestic markets as a consequence of the price freeze. In order to meet the domestic demand, especially for basic food items, various emergency import programmes were initiated for these goods while import controls for other commodities, such as capital goods, were tightened, thus hindering export-producing industries. Both factors worked as a brake to the export drive experienced in the last three years. Total exports declined from a peak of US $2.29 billion in May to a low of US $1.28 billion in November 1986. This development was accompanied by a

worsening of the trade balance and a rapid decline in international re-serves.

In October 1986, the government realized that the Cruzado-Plan and the subsequent stabilization measures had failed. Price controls were lifted, the system of mini-devaluations was re-introduced and indexation schemes were re-implemented. As the basic sources of inflation have not been removed, inflation again gained momentum with rates comparable with those in the last months of the Cruzeiro-era (1).

3. World Trade, Rising Protectionism, and the New GATT-Round

Reallocating domestic resources in favour of export production might be seen as an important step towards handling the external debt problem and achieving a more efficient allocation of resources. However, if export markets do not absorb the increased export supply, policy reforms must fail. In the past, the growth in world merchandise trade exceeded the increase in merchandise output, pointing to the on-going specialisation in the world economy, in particular in the area of manufactures (Table 24). However, the average annual increase of manufactured export volumes abated from 10.5 per cent in the 1960-1970 period to 4.5 per cent in the 1980s (1980-1986).

The slow-down in economic growth in the industrial countries contributed to the generally weak export markets for primary goods and had an ad-verse effect on the foreign-exchange earnings of developing countries - and thus on their demand for imports of manufactures. Another factor of the recent weak performance of trade in manufactures was that unusually large trade imbalances in the world's leading trading nations, and fre-quent and large variations in exchange rates gave rise to protectionist pressures, whilst the reluctance of producers to adjust to changes in comparative advantage remained a major challenge to the trading system.

(1) The inflation rate for April 1987 was close to 20 per cent per month.

Table 24 – Real Growth of World Merchandise Trade and Production, 1960-1986 (average annual percentage change)

	1960–1970	1970–1980	1980–1986	1985	1986
Exports					
Agriculture	4	4.5	1.5	0	1
Mining	7	1.5	-1	-1	7
Manufacturing	10.5	7	4.5	5.5	3
All merchandise	8.5	5	2	3.5	3.5
Production					
Agriculture	2.5	2	2.5	2	3
Mining	5.5	2.5	-1.5	-0.5	5
Manufacturing	7.5	4.5	2.5	4	2
All merchandise	6	4	2	3	3

Source: GATT [1986].

While in the 1980s liberalization achievements of the past have been consolidated on the tariff front (1), the tariff reductions have not been accompanied by a dismantling of non-tariff barriers in recent years. On the contrary, it appears that pressures for non-tariff protection have intensified and governments have continued to move towards the regulation of trade.

The main features of the new and rising protectionist tide are [Donges, 1986, p. 6]:

- concentration on non-price measures (especially "voluntary" export restraints, orderly marketing agreements, anti-dumping measures, variable import levies, administrative guidance, subsidies);

- selectivity to the (alleged) needs of specific sectors (such as agriculture, textiles and clothing, footwear, leather products, ceramics,

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(1) However, it has to be kept in mind that: nominal tariff rates continued to increase with the stage of processing; the depth of tariff cuts was lower than average for imports of industrial goods from developing countries; the coverage of trade in agricultural products was limited; and import tariffs continued to be non-binding to a considerable extent.

steel, shipbuilding, consumer electronics, watches, automobiles, machine tools, several high-technology industries);

- discrimination against the most competitive suppliers from abroad (generally Japan and the NICs).

Especially sectoral protectionism, which aims at saving jobs in declining industries in the advanced countries, has prevented Brazil and other NICs from making full use of their comparative advantage in the manufacture of labour-intensive products (shoes, leather products, and the like) as well as activities which embody standardized technology (such as steelmaking).

Whether or not the trend towards selective protectionism will continue into the future is impossible to predict. The forthcoming multilateral trade negotiations (the Uruguay-Round) will be extraordinarily complex and may require the application of an item-to-item approach (1). Hopes that world trade will in fact be freed from the many selective and discriminatory interferences might be unrealistic. For example, there is little chance of getting the Multi-Fibre Agreement abolished. The EC is unlikely to make a major move in reforming its common agricultural policies. There are no signs that the United States and the EC will reshape their national steel policies in the immediate future to allow freer trade in steel products, nor are governments taking decisive action to reduce subsidies in general. Furthermore, it remains a controversial issue to what extent trade in services should be included in the negotiations. The developing countries have not yet shown much readiness to take a more active part in the forthcoming negotiations than they did in the past. Finally, the chance of getting an effective GATT code on safeguards has not greatly improved since the Tokyo-Round, during which no agreement was reached.

Despite this somewhat bleak scenario on trade restrictions it would be a mistake for Brazil and other NICs to fall into export pessimism. Brazil's export boom in the 1983-1985 period clearly demonstrates that, by di-

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(1) For an in-depth discussion of the prospects for trade liberalization, see Donges [1986, pp. 25 ff.].

versifying exports towards new products and markets, the export-re-
tarding effects arising from the slow-down of economic growth in some
industrialized countries as well as rising protectionist tendencies can be
overcome. Furthermore, additional trade could be created through fur-
ther inter-industry specialization between Brazil (and other NICs) and
other developing countries, but also through enforced intra-industry
specialization between Brazil and other more advanced developing coun-
tries (1). Although the South-South trade potential is considerable, im-
port liberalization on a broad scale is an indispensable precondition to
exhaust this potential.

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(1) For a discussion of this issue, see Hiemenz, Langhammer [1986] and
    the literature cited therein.

VII. Summary and Conclusions

In assessing Brazil's performance in exporting manufactured goods until the mid 1980s, the following hypotheses figured prominently in the empirical analysis of this study. Given world demand conditions, industries achieved their competitive position in world markets because:

- Brazil enjoyed a comparative advantage in the production of those manufactured goods that relied heavily on factors of production with which she was relatively well equipped;

- Brazilian suppliers could sell their industrial products to other developing countries with consumer preferences and techniques similar to those in Brazil;

- special trading arrangements with other Latin American countries, as well as government interventions created a competitive edge for domestic industries which had no comparative advantage.

Brazil is still relatively well equipped with (unskilled) labour, whereas capital represents the scarce production factor, especially in the form of human capital. Hence, her comparative advantages in the international division of labour are concentrated on labour-intensive products. Such exports continued to account for a significant share in Brazilian sales to developed country markets. However, rather capital-intensive products dominated her exports to the ALADI region, in particular, and has recently gained in importance even in developed countries.

In ALADI markets, similarities in demand favoured Brazil's capital-intensive exports. This applied to overseas sales of transport equipment, for example. Moreover, the Brazilian export pattern of the 1970s was influenced by attempts made by ALADI to elevate import-substitution policies at the regional level. Discriminations against imports from outside ALADI induced capital-intensive supplies to the Latin American market by the most advanced ALADI members such as Brazil. In the meantime, the regional approach towards free trade has been largely abandoned and replaced by bilateral trading arrangements. Trade conditions within ALADI have thus become more complicated in the 1980s. Although it is to be

expected that Brazil's exports to neighbouring Latin American countries will remain rather capital-intensive, major adjustments may be required in some sectors. For example, Brazilian supplies of machinery and transport equipment will be negatively affected if other ALADI members insist on greater shares in the production of such industries.

The increase in the share of capital-intensive products in Brazilian exports to developed countries can to some extent be attributed to the product-cycle hypothesis, according to which developing countries enjoy a comparative advantage in producing standardized goods, which are capital-intensive in terms of physical capital, but do not require considerable inputs of highly skilled labour (human capital). Although Brazil's constraints on the availability of physical capital were not very strong until the early 1980s because she could easily tap international capital markets and was given priority by multinational corporations as regards foreign direct investment, the findings for the 1970s suggest that she did not make use of its comparative advantage in supplying standardized product-cycle goods as significantly as might have been expected. In general, Brazilian industries of relatively high physical capital intensity were also characterized by a relatively high skill intensity. Only when economic policies in Brazil, in the second half of the 1960s and early 1970s, were largely in line with the country's comparative advantage, was the improvement in export performance most striking in industries with rather low skill requirements. This result can be taken as an indication of Brazil's future export potential of standardized goods, provided that economic policies support this process and problems in servicing foreign debt do not result in serious constraints in attracting further financial inflows from abroad.

It was rather policy interventions which were the reason why the share of capital-intensive Brazilian exports to developed countries increased. In fact, export subsidies were found to be related positively to Brazil's export performance in the US and other developed economies. In contrast to the traditionally cascading structure of protection in developing countries, the highest protection in Brazil was granted to capital goods industries and the lowest to consumer goods industries in 1980. However, the bias of Brazilian trade policies towards rather capital-intensive in-

dustries could not be proven to be statistically significant, partly due to the inconsistencies in incentive policies towards exports and domestic sales which weakened the policy impact on exports.

The preferential treatment of sectors, such as transport equipment, which the government justified by referring to infant-industry arguments, clearly helped to expand overseas sales. However, such policies give rise to several problems, indicating their costs: government interventions discriminating against traditional export items will affect the future export performance in one of Brazil's principal export domains, i.e., labour-intensive products. The traditional sectors will, to a great extent, probably have to bear the considerable fiscal costs arising from high levels of nominal incentives granted to priority sectors. Furthermore, the unequal dispersion of incentive schemes among industries and the complexity of the government regulations will induce a misallocation of resources and will conserve inefficiencies within industries which may hamper industrial growth and export expansion in the medium and long run.

Firm-specific data point to policy discriminations at the firm level as well, especially with respect to firm size. Export subsidy rates granted by the Brazilian government increased with the size of the exporting firms. This policy bias further reduced the capability of relatively small enterprises to export. The export potential of smaller enterprises may be attributed to higher efficiency and flexibility in responding to changes in world demand. In this case, the policy bias against small firms poses a serious threat to Brazil's further export expansion.

Continued high growth in manufactured exports represents a major prerequisite to sustain overall economic development in the future. The results of this study suggest that, despite Brazil's impressive export performance both in terms of absolute growth and relative to other world market suppliers, considerable scope exists for further expansion. Firstly, the potential of export market diversification is not exhausted, as indicated by the persistently strong dominance of US and ALADI markets for Brazil's manufactured exports. Secondly, there is plenty of room for further product differentiation: out of the fifteen most important export

items in 1981, ten still belong to the non-manufactured category, accoun-
ting for nearly half of total Brazilian exports. Thirdly, the export ratio
of most manufacturing industries continued to be considerably below 10
per cent in the early 1980s; the Brazilian share in world exports was
still rather small. Thus world demand will not be the decisive constraint
for further rapid export expansion.

But further expansion of Brazilian manufactured exports would be diffi-
cult to achieve under the policy framework that prevailed during most of
the 1970s. Most importantly, the exchange-rate policy must be flexible
enough to avoid overvaluation; the unequal dispersion of incentive
schemes among industries should be reduced; export subsidies have to
be simplified and applied less discriminatorily to smaller firms; and the
access to imported inputs and technology for export production should
be improved in order to reduce the considerable anti-export bias in many
industries.

Some crucial questions on Brazil's export performance are left open in
this study.

- The observation that the Brazilian government heavily discriminated
  between different industries and even between different branches and
  types of enterprises within industries, as regards economic incentives
  granted to domestic and export sales, underlines the relevance of a
  fairly disaggregated analysis. Present research on the current prob-
  lems and future prospects of the Brazilian economy within the interna-
  tional division of labour is therefore concentrated on more detailed
  studies for individual sectors.

- The evaluation of the Cruzado-Plan has shown that inconsistencies in
  stabilization policies have strongly negative consequences for Brazil's
  exports. Other policy-induced internal bottlenecks which have to be
  analysed in more detail refer to government interventions hindering the
  functioning of labour and capital markets. Closer attention has also to
  be given to tendencies to reserve market segments for local producers
  in Brazil which may seriously erode her capability to attract foreign
  capital.

- Finally, major developments in world markets have to be assessed. For instance, it is relevant to know the consequences of the rising protectionist tide of industrialized countries in sectors such as steel and textiles for Brazil's exports. In this context, it has to be analysed if and to what extent inter-industry specialization between Brazil and less developed countries and intra-industry specialization between Brazil and other newly industrializing countries can be an alternative to trade with industrialized countries. The destination and commodity structure of Brazilian exports will also depend on the transformation of ALADI into a complex system of trading arrangements.

Appendix

1. Export Expansion and Economic Growth: The Brazilian Case

Various studies have been carried out to determine the role exports play in economic growth of developing countries [e.g., see Balassa, 1978; Michaely, 1977; Krueger, 1978; Tyler, 1981a; Kavoussi, 1984]. Most of them have used a cross-country sample and confirmed a positive and strong association between export performance and GNP growth. Our purpose here is to examine whether this was also true for Brazil for the 1969-1984 period.

Similar to Ram [1985], the aggregate production function was defined as follows:

[i] $Y = f(L; K; X)$

where:

Y = aggregate real output; K = capital input;

L = labour input; X = exports.

Ram treats exports as an input in the production function. This specification is fairly standard and common in the literature. The equation finally estimated has the following form:

[ii] $Y = a_O + a_1 L + a_2 I/Y + a_3 X$.

The variables are expressed in rates of growth. Since the rate of growth of capital input (K) was not known, the investment-income ratio (I/Y), as suggested by Ram, is used as a proxy. Equation [ii] is estimated using annual data for the 1969-1984 period. Until 1981 the data are only taken from World Bank [d], and thereafter from IMF [b]. Two different dependent variables are used: total output growth (Y), and total manufactured output growth (MI). Therefore, we also use two measures of exports: total and manufactured exports.

The econometric results of equation [ii] for different definitions of the dependent variable are as follows (see also Table Al):

- In the case of MI, labour force growth proved to be statistically insignificant. In all the equations, the manufactured export growth variable shows large and statistically significant coefficients. The investment variable is statistically significant as well.

- In the case of Y, the results differ from above. While the investment variable is statistically significant in practically all regression equations, the same is not true for the export variable. Only when the latter is defined as manufactured export growth, does it become important, otherwise it turns out to be insignificant.

All in all, we can conclude that manufactured exports and investment had both a positive and significant impact on industrial output growth. However, the investment variable (I/Y) was more relevant when the dependent variable was total output growth. The fact that manufactured exports were statistically significant for total output emphasizes that export growth may have had a dynamic and multiplier effect in the economy as a whole, independent of their origin. Thus, export expansion has had a positive and significant impact in Brazil, particularly in the industrial sector.

Appendix Tables

Table A1 - Export Expansion and Economic Growth: Regression Results for Brazil (a), 1969-1984

Constant	Independent variable				$\overline{R}^2$	SER	F	D.W.	Rho(b)
	$\overset{.}{XM}$	$\overset{.}{XT}$	I/Y	$\overset{.}{L}$					
dependent variable: $\overset{.}{MI}$									
-35.084 (-4.754)	0.363 (5.325)	n.a.	1.319 (4.814)	n.a.	0.737	4.622	20.302 (2.13)	2.760	-0.553 [3]
-2.685 (-0.029)	0.346 (4.197)	n.a.	1.326 (4.649)	-11.553 (-0.352)	0.716	4.787	13.632 (3.12)	2.703	-0.549 [3]
dependent variable: $\overset{.}{Y}$									
28.410 (-5.066)	0.262 (5.0756)	n.a.	1.130 (5.429)	n.a.	0.751	3.430	21.769 (2.13)	2.632	-0.514 [4]
-7.891 (-0.113)	0.252 (4.010)	n.a.	1.135 (5.219)	-7.313 (-0.294)	0.730	3.558	14.493 (3.12)	2.584	-0.507 [4]
-14.753 (-1.145)	n.a.	0.025 (0.338)	0.830 (1.666)	n.a.	0.102	4.172	1.707 (2.13)	2.041	0.375 [3]
74.314 (0.740)	n.a.	0.039 (0.503)	0.961 (2.126)	-33.223 (-0.916)	0.143	4.257	1.837 (3.12)	1.991	0.228 [4]

(a) First-order serial correlation of the error maximum likelihood iterative technique was used to estimate the regressions; t-values in parentheses. The symbols used are: MI = total manufacturing production (as defined by Brazilian statistics: e.g., it also includes food, beverages, and tobacco); L = labour force; I = total nominal gross domestic investment; Y = total nominal output (GDP); XM = manufactured exports; XT = total exports; Y = total output. Dotted symbols are average annual percentage rates of growth in real terms (except for L). - (b) Number of iterations needed to achieve convergence of Rho is shown in square brackets.

Source: World Bank [c]; IMF [b]; own calculations.

Table A2 - Basic Economic Indicators in Brazil, 1970-1986

Year	Per capita income	Gross domestic product	Production		Rate of inflation		Domestic savings	Gross domestic investments
			industry	agriculture	CPI	general(a)		
	annual real growth rates in per cent				per cent		percentage of GNP	
1970	6.2	8.8	10.4	1.0	20.9	19.8	24.4	23.8
1971	9.3	12.0	12.0	18.7	18.1	18.7	23.6	24.7
1972	8.4	11.1	13.0	4.1	14.0	16.8	23.8	25.2
1973	10.8	13.6	16.3	3.6	13.0	16.2	25.8	25.8
1974	7.1	9.7	9.2	8.2	33.8	33.8	24.0	27.9
1975	2.7	5.4	5.9	4.8	31.2	30.1	27.1	29.6
1976	7.1	9.7	12.4	2.9	44.8	48.1	23.8	26.7
1977	3.2	5.7	3.9	11.8	43.1	38.6	24.0	25.2
1978	2.5	5.0	7.2	-2.6	38.7	40.5	22.2	24.4
1979	3.8	6.4	6.4	5.0	76.0	76.8	18.1	22.3
1980	4.6	7.2	7.9	6.3	86.3	110.2	17.9	21.8
1981	-4.0	-1.6	-5.5	6.4	100.6	95.2	16.9	21.2
1982	-1.5	0.9	0.6	-2.5	101.8	99.7	15.5	21.2
1983	-5.5	-3.2	-6.8	2.2	177.9	211.0	13.3	16.9
1984	2.0(p)	4.5	6.0(p)	3.2(p)	208.7	223.8	16.3	16.4
1985	5.7(p)	8.3	9.0(p)	8.8(p)	248.5	235.1	16.1	16.3
1986(p)	n.a.	7.7	12.1	-7.3	70.5	65.3	15.4	16.4

Year	Real exchange rate(b)	Export share in GDP	Import share in GDP	Exports(c)	Imports(c)	Trade balance	International reserves(d)	Foreign debt(d)
	per cent			US $ billion				
1970	9.12	6.4	5.9	2.7	2.5	0.2	1.2	5.3
1971	9.14	5.9	6.7	2.9	3.3	-0.4	1.7	6.6
1972	9.00	6.8	7.2	4.0	4.2	-0.2	4.2	9.5
1973	8.52	7.8	7.8	6.2	6.2	0.0	6.4	12.6
1974	8.35	5.6	12.0	8.0	12.6	-4.6	5.3	17.2
1975	8.13	7.0	9.9	8.7	12.2	-3.5	4.0	21.2
1976	7.60	6.6	8.1	10.1	12.4	-2.3	6.5	26.0
1977	7.39	5.7	6.8	12.1	12.0	0.1	7.3	32.0
1978	7.66	6.3	6.8	12.7	13.7	-1.0	11.9	43.5
1979	7.50	6.8	8.0	15.2	18.1	-2.9	9.7	49.9
1980	8.63	8.4	9.6	20.1	23.0	-2.9	6.9	66.2
1981	8.39	8.8	8.3	23.3	22.1	1.2	7.5	74.1
1982	8.42	7.6	8.2	20.2	19.4	0.8	4.0	83.2
1983	11.09	10.8	7.6	21.9	15.4	6.5	4.6	91.6
1984	11.81	12.8	6.6	27.0	13.9	13.1	7.5	100.2
1985	n.a.	11.7	6.0	25.6(p)	13.2(p)	12.5	7.7	100.9
1986(p)	n.a.	8.5	4.9	25.2	12.9	9.5	4.9(e)	109.3(f)

(a) General price index. - (b) Defined as the nominal exchange rate times the US wholesale price index deflated by the GDP implicit price deflator. - (c) Services not included. - (d) End-of-year figures. - (e) November 1986. - (f) June 1986, including US $9.7 billion short-term debt. - (p) = Preliminary.

Source: Banco Central do Brasil [various issues]; FGV [various issues]; IBGE [a]; International Currency Review [1986]; Martone [1987, Table 4]; Morgan Guaranty Trust Company [1987]; Simonsen [1986, Tables II and III]; Suma Economica [1986]; Tyler [1981a, Tables 1-1 and 1-3]; own estimates and calculations.

Table A3 – Manufactured and Primary Exports to Major Markets as a Per Cent of Total Brazilian Exports, 1965-1981

Year	Destination country			Exports to ALADI as a per cent of exports to LDCs
	industrialized countries	LDCs	ALADI	
manufactured exports (a)				
1965	45.1	52.8	49.8	92.7
1970	56.1	42.1	36.7	87.3
1973	63.5	34.4	24.7	71.9
1975	52.0	46.5	34.6	74.4
1979	49.8	49.0	34.1	69.6
1980	43.5	54.8	38.6	70.5
1981	43.5	54.6	38.5	70.6
1982	51.7	46.6	27.8	59.7
primary exports (b)				
1965	80.6	13.6	10.7	78.6
1970	81.4	13.8	8.0	57.9
1973	77.8	14.4	5.4	37.9
1975	67.2	20.5	7.3	35.9
1979	71.9	17.9	7.7	43.1
1980	69.3	21.1	6.8	32.3
1981	63.4	25.5	7.3	28.7
1982	67.4	23.8	7.3	30.6
(a) SITC 5 to 8-(67+68). – (b) SITC 0 to 4+(67+68).				

Source: UN [a]; own calculations.

Table A4 – Brazil's Nominal Export Growth in Different SITC Categories (a), 1963-1981 (per cent)

SITC	Industry	1963-1973	1974-1981	SITC	Industry	1963-1973	1974-1981
5	Chemicals	8	23	7	Machinery, transport equipment	39	31
541	Medicinal products	25	24	71	Non-elec. machinery	39	30
55	Perfume, soap	21	9	72	Electrical machinery	56	18
581	Plastics	n.a.	44	73	Transport equipment	33	40
6(b)	Basic manu-factures	42	19	8	Miscellaneous manu-factures	73	18
61	Leather products	45	19	84	Clothing	n.a.	1
63	Wood products	5	20	851	Footwear	98	25
64	Paper products	n.a.	30	892	Printed matter	n.a.	10
65	Textiles	50	12	Total manufacturing		40	24
66	Non-metal mineral manufactures	50	21				

(a) Annual averages. Real growth rates for individual SITC categories could not be calculated since information on adequate price deflators was not available. – (b) Excluding SITC 67 and 68.

Source: UN [a]; own calculations.

Table A5 - Manufactured Export Structure of Different Regions and of Brazil, 1965-1981 (per cent of total manufactured exports of each region)

Region	SITC	1965	1970	1973	1978	1981
World	5	13	13	13	13	14
	6-(67+68)+8	38	35	36	34	34
	7	49	52	51	53	52
Developing	5	13	11	9	9	10
countries	6-(67+68)+8	77	72	70	65	62
	7	10	16	21	26	29
South and	5	6	5	4	4	5
South-East	6-(67+68)+8	85	80	76	70	66
Asian countries	7	9	15	20	26	28
Brazil	5	19	15	10	7	12
	6-(67+68)+8	45	49	63	42	36
	7	36	37	27	52	52

Source: UNCTAD [various issues]; own calculations.

Table A6 - Classification of Brazilian Industries According to Capital Investment per Employee (a), 1960-1979

SITC	1960	1968	1970	1974	1979
58	Plastics	Chemicals	Chemicals	Chemicals	Chemicals
5	Chemicals	Transp. equip.	Transp. equip.	Transp. equip.	Paper products
73	Transp. equip.	Plastics	Paper products	Paper products	Transp. equip.
64	Paper products	Non-metallics	Plastics	Plastics	Plastics
71	Mechanics	Paper products	Non-metallics	Mechanics	Pharmaceuticals
72	Electr. equip.	Perfumery	Electr. equip.	Non-metallics	Perfumery
66	Non-metallics	Electr. equip.	Pharmaceuticals	Perfumery	Mechanics
55	Perfumery	Mechanics	Perfumery	Textiles	Non-metallics
54	Pharmaceuticals	Printed matter	Mechanics	Pharmaceuticals	Electr. equip.
89	Printed matter	Pharmaceuticals	Textiles	Wood products	Printed matter
65	Textiles	Wood products	Printed matter	Printed matter	Wood products
63	Wood products	Textiles	Wood products	Electr. equip.	Textiles
61	Leather products	Leather products	Leather products	Leather products	Leather products
84-85	Clothing, footwear	Clothing, footwear	Clothing, footwear	Clothing, footwear	Clothing, footwear

(a) Reading from the top downwards, the industries become less capital-intensive.

Source: IBGE [a]; own calculations.

Table A7 - Regional Distribution of Brazilian Manufactured Exports at
        1-Digit SITC Level, 1962-1981 (per cent)

Destination country	1962	1967	1973	1978	1981
Total manufactured exports					
US	30.0	29.3	25.6	25.2	18.8
Other developed ecs.	32.0	22.3	37.9	26.8	24.8
EEC+EFTA	22.6	19.6	26.0	20.2	17.6
ALADI	30.2	38.5	24.3	29.6	38.6
Centrally-planned ecs.	3.1	2.9	2.1	1.0	1.9
Other countries(a)	5.0	7.1	9.7	17.3	16.0
5 Chemicals					
US	46.4	38.8	22.1	18.6	18.0
Other developed ecs.	37.7	26.8	40.9	37.7	34.8
ALADI	8.8	15.4	24.1	36.2	31.2
Centrally-planned ecs.	3.3	2.8	2.0	0.9	2.2
Other countries(a)	3.8	16.2	10.9	6.6	13.8
6-(67+68) Basic manufactures					
US	38.8	36.7	14.7	18.4	14.2
Other developed ecs.	28.6	21.9	57.5	41.7	32.8
ALADI	24.0	34.2	13.7	22.1	30.5
Centrally-planned ecs.	3.9	6.6	4.5	3.4	4.9
Other countries(a)	4.7	0.6	9.6	14.4	17.6
7 Machinery and transport equipment					
US	3.7	16.9	25.2	22.5	14.5
Other developed ecs.	26.5	18.9	14.9	17.2	19.2
ALADI	66.1	58.3	49.2	35.7	46.5
Centrally-planned ecs.	2.4	0	0	0	0
Other countries(a)	1.3	5.9	10.7	24.6	19.8
8 Misc. manufactured goods					
US	24.9	20.4	47.6	49.1	43.3
Other developed ecs.	13.7	27.0	29.2	28.9	23.6
ALADI	59.1	49.9	14.8	19.2	27.8
Centrally-planned ecs.	0	0	0	0.4	0.5
Other countries(a)	2.3	2.7	8.4	2.4	4.8
(a) Includes developing Africa, Asia, and Oceania, Malta, Spain, Yugoslavia, the Caribbean, and the rest of developing America.					

Source: UN [a]; own calculations.

Table A8 – Gini Coefficients of Brazilian Manufactured Export Concentration in Different Export Markets, 1962-1981 (a)

	World	Developed countries	Developing countries	ALADI	NICs (b)	Centrally -planned economies
1962	0.4025	0.4626	0.4754	0.5040	0.7220	0.4754
1967	0.3521	0.3421	0.4359	0.4637	0.4483	0.7649
1979	0.3450	0.3286	0.4099	0.3886	0.3536	0.6950
1981	0.3564	0.3332	0.4182	0.4025	0.3550	0.5675
1962-1981 (c)	-11.5	-28.0	-12.0	-20.1	-51.9	19.4
1962-1973 (c)	-23.4	-29.3	-27.8	-27.4	-49.1	83.6
1973-1981 (c)	+15.6	+2.0	21.8	9.9	-3.4	-35.0

(a) The Gini coefficient was calculated as follows:

$$\left[\sum_{j=1}^{n} (X_{ij}/X_{im})^2 \right]^{\frac{1}{2}}$$

$j = 1 \ldots 26$ (SITC at 2-digit level)
$i = 1 \ldots 6$ (export markets)

where:

X_{ij} = exports of industrial sector j to market i;

X_{im} = total manufactured exports to market i.

(b) Argentina, Hong Kong, South Korea, Singapore and Taiwan. - (c) Percentage change of the Gini coefficient in the period.

Source: UN [a]; own calculations.

Table A9 - RCA Values for Brazil's Trade with the World, 1965-1982

SITC	Industry	1965	1970	1975	1980	1982
	Food					
01	Meat and meat preparations	100.0	98.8	84.7	69.1	95.8
022-024	Dairy products	-100.0	-91.1	-100.0	-92.2	-86.9
053	Fruit preserved and fruit preparations	100.0	95.7	97.2	98.5	99.4
054.6 + 055	Vegetables frozen and vegetables preserved or prepared	100.0	10.5	0.5	-37.7	-48.3
03	Fish and fish preparations	-10.5	12.8	14.2	17.3	45.6
042	Rice	100.0	-100.0	-85.2	-99.1	-81.4
046	Meal and flour of wheat	-100.0	-100.0	-100.0	-100.0	24.1
047	Meal and flour of cereals	-100.0	-100.0	5.8	-100.0	20.1
048	Cereal preparations	-100.0	-100.0	-86.6	-70.2	-87.4
06	Sugar preparations and honey	100.0	98.8	99.8	99.4	99.2
071.3	Coffee extracts and similar preparations of coffee	100.0	100.0	100.0	100.0	100.0
072.2,3 + 073	Cocoa powder, cvbutter and cvpaste, and chocolate	100.0	98.8	99.8	99.9	99.9
411	Animal oils and fats	-100.0	-100.0	-98.2	-99.3	-100.0
421	Fixed vegetable oils, soft	-100.0	24.6	86.2	80.8	89.4
422	Other fixed vegetable oils	98.7	99.1	98.2	91.2	95.6
091.4 + 099	Margarine and food preparations, n.e.s.	n.a.	-100.0	87.0	96.5	95.0
	Beverages and tobacco					
111	Non-alcoholic beverages, n.e.s.	n.a.	n.a.	63.9	100.0	100.0
112	Alcoholic beverages	-53.9	-35.3	-57.7	-22.4	3.6
122	Tobacco manufactures	100.0	100.0	91.3	95.7	100.0
	Textiles, clothing, footwear, and leather products					
65	Textile yarn, fabrics, made-up articles and related products	87.0	36.2	60.3	78.1	80.7
84	Clothing	100.0	8.6	91.4	89.9	88.3
85	Footwear	100.0	100.0	99.6	98.9	98.7
61	Leather, leather manufactures, n.e.s., and dressed fur skins	90.5	95.2	88.7	88.0	57.6
83	Travel goods, handbags, and similar articles	n.a.	-100.0	82.7	86.1	94.8
	Wood products, furniture					
63	Wood and cork manufactures (excluding furniture)	93.5	95.1	88.3	81.8	86.3
82	Furniture	100.0	85.2	77.6	64.6	82.9

Table A9 continued

SITC	Industry	1965	1970	1975	1980	1982
64	Paper, cardboard and manufactures thereof	−100.0	−95.7	−51.3	−14.5	16.8
	Chemical and rubber products					
51	Chemical elements and compounds	−79.5	−73.7	−73.6	−68.8	−21.6
53	Dyeing, tanning, and colouring materials	−60.7	−46.1	−66.2	−62.9	−35.3
56	Fertilizers, manufactured	−100.0	−100.0	−97.4	−99.3	−93.1
57	Explosives and pyrotechnic products	n.a.	100.0	83.8	95.3	93.7
58	Plastic materials	−78.0	−96.0	−65.3	−52.1	9.2
59	Chemical materials and products, n.e.s.	−90.3	−72.3	−58.9	−43.6	−11.2
54	Medicinal and pharmaceutical products	−61.3	−49.2	−68.1	−60.1	−28.7
55	Essential oils and perfume materials	15.6	23.4	22.1	23.4	33.7
52	Mineral tar and crude chemicals from coal, petroleum and natural gas	−100.0	−100.0	−100.0	−95.5	−11.2
62	Rubber manufactures, n.e.s.	74.9	11.5	−4.8	23.9	40.2
66	Non-metallic mineral manufactures, n.e.s.	−43.1	14.7	10.1	12.7	33.0
	Metals and metal products					
67	Iron and steel	20.5	16.4	−65.5	18.3	59.4
68	Non-ferrous metals	−97.3	−85.2	−78.5	−80.0	−68.1
69	Manufactures of metal, n.e.s.	−80.2	−61.7	−36.0	4.9	6.6
	Machinery and transport equipment					
71	Machinery, other than electric	−70.7	−63.7	−59.4	−27.1	3.7
72	Electrical machinery, apparatus and appliances	−75.7	−72.7	−57.8	−49.7	−35.1
73	Transport equipment	−58.6	−75.5	5.0	20.6	64.2
	Other manufactured articles					
81	Sanitary, plumbing, heating and lighting, fixtures and fittings	100.0	9.6	61.0	78.8	73.6
86	Professional, scientific and controlling instruments; photographic and optical goods; watches and clocks	−93.3	−92.6	−78.6	−60.8	−39.2
89	Miscellaneous manufactured articles, n.e.s.	−60.9	−41.6	−2.3	−4.0	3.7

Source: UN [a]; own calculations.

Table A10 – Revealed Comparative Advantage for Manufacturing Industries at 1 and 2-Digit SITC Level for Brazil, 1962-1981

SITC	Destination Country (b)	1962	1967	1968	1973	1974	1978	1979	1981
5	Chemicals								
	World	-83.33	-77.69	-84.94	-80.76	-81.63	-78.73	-73.35	-39.65
	Developed ecs.	-84.88	-83.04	-88.11	-86.31	-85.84	-86.15	-84.46	-57.47
	Developing ecs.	-51.73	-22.24	-49.59	-35.11	-43.75	-22.82	-9.61	23.44
	- ALADI	-61.50	-37.90	-49.49	-35.13	-22.65	-18.09	-1.03	18.13
	- NICs	-14.46	-27.41	-31.62	-19.14	-2.58	-2.59	12.12	40.81
	Centr.-planned ecs.	-81.49	-79.15	-84.15	-63.75	-89.21	-88.28	-85.11	-30.09
51	Organic chemicals								
	World	-77.84	-72.25	-82.04	-81.31	-78.50	-84.06	-78.87	-35.14
	Developed ecs.	-79.22	-79.18	-85.74	-84.64	-82.08	-88.94	-85.83	-43.48
	Developing ecs.	-20.87	-3.99	-30.53	-40.48	-40.17	-46.32	-38.52	-4.02
	- ALADI	-44.73	-50.71	-65.43	-57.83	-35.05	-41.94	-26.04	-10.48
	- NICs	-100.00	-46.22	-51.05	-15.28	11.84	-10.68	-5.61	8.14
	Centr.-planned ecs.	-86.97	-88.83	-91.32	-90.31	-92.99	-100.00	-100.00	23.07
53	Dyes, colour, tanning								
	World	-95.42	-70.89	-80.78	-87.60	-88.94	-61.25	-64.53	-44.95
	Developed ecs.	-100.00	-82.68	-87.48	-95.29	-97.07	-88.53	-88.19	-79.61
	Developing ecs.	-100.00	100.00	41.34	12.64	21.16	5.94	-10.03	22.62
	- ALADI	-100.00	100.00	-100.00	0.61	16.22	-19.63	-25.45	14.65
	- NICs	-100.00	0.00	-100.00	-70.71	-14.79	-73.92	-65.49	-4.32
	Centr.-planned ecs.	-43.37	-3.86	-17.67	-38.68	5.76	48.48	53.87	16.17
54	Medicinal products								
	World	-86.52	-70.63	-79.91	-80.84	-77.99	-67.90	-62.83	-45.43
	Developed ecs.	-93.00	-77.57	-91.96	-91.30	-86.59	-81.67	-80.74	-71.48
	Developing ecs.	-47.73	-27.11	-26.21	-36.65	-35.94	-2.30	12.15	44.89
	- ALADI	-40.96	0.12	-17.99	44.86	13.41	26.70	34.83	76.99
	- NICs	-100.00	4.80	29.65	-31.19	-72.35	-63.50	-42.99	33.50
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-41.16	-43.05	-46.65	-26.15	-14.54
55	Perfume, soap								
	World	-4.78	3.38	-17.18	-7.38	-3.00	-0.60	7.90	35.68
	Developed ecs.	-8.17	-6.61	-23.81	-22.29	-6.85	-5.56	-5.05	16.65
	Developing ecs.	100.00	100.00	100.00	53.30	12.77	-11.51	31.0	56.41
	- ALADI	0.00	100.00	100.00	-3.46	-29.71	-7.39	23.23	40.32
	- NICs	0.00	100.00	0.00	-100.00	-33.13	27.97	26.72	63.36
	Centr.-planned ecs.	100.00	100.00	100.00	100.00	0.00	0.00	0.00	100.00
56	Fertilizers								
	World	-100.00	-100.00	-100.00	-97.31	-99.49	-99.10	-98.58	-98.09
	Developed ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
	Developing ecs.	-100.00	-100.00	-100.00	-81.76	-95.37	-70.14	-56.07	-73.21
	- ALADI	-100.00	-100.00	100.00	-70.04	-38.08	-66.52	-54.24	-72.75
	- NICs	0.00	0.00	0.00	0.00	0.00	19.66	-100.00	-100.00
	Centr.-planned ecs.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
57	Explosives, pyrotechnical products								
	World	0.00	100.00	18.96	83.95	49.06	92.23	85.16	91.74
	Developed ecs.	0.00	0.00	-100.00	-100.00	-1.38	71.82	9.83	45.84
	Developing ecs.	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	- ALADI	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	- NICs	0.00	0.00	0.00	100.00	0.00	100.00	100.00	100.00
	Centr.-planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	Plastics								
	World	-100.00	-95.27	-97.97	-88.87	-93.04	-86.47	-72.51	-9.00
	Developed ecs.	-100.00	-100.00	-100.00	-94.83	-96.58	-94.60	-94.52	-79.31
	Developing ecs.	0.00	47.83	20.23	13.85	-35.79	0.22	49.71	92.47
	- ALADI	0.00	100.00	100.00	12.38	-9.63	1.89	53.40	94.68
	- NICs	0.00	0.00	100.00	-49.96	-35.49	74.62	85.48	98.99
	Centr.-planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-100.00	-61.64	82.17
59	Chemical materials, NES								
	World	-100.00	-94.79	-94.20	-75.24	-70.11	-58.57	-49.36	-41.87
	Developed ecs.	-100.00	-94.77	-94.93	-81.60	-78.39	-69.49	-60.79	-59.99
	Developing ecs.	-100.00	-100.00	-77.55	-27.82	-13.80	-1.60	10.07	10.07
	- ALADI	-100.00	-100.00	-100.00	29.47	-13.85	16.49	15.68	12.39
	- NICs	-100.00	-100.00	-100.00	6.60	4.42	49.07	57.08	17.39
	Centr.-planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-51.43	-69.58	-31.35
6	Basic manufactures								
	World	-83.04	-39.05	-45.24	8.29	-15.42	27.91	-73.35	-39.65
	Developed ecs.	-87.13	-52.98	-58.86	-1.39	-26.29	13.02	-84.46	-57.47
	Developing ecs.	24.60	33.26	14.19	45.12	27.81	57.28	-9.61	23.44
	- ALADI	16.46	33.73	24.98	26.09	13.21	40.28	-1.03	18.13
	- NICs	21.46	77.84	75.55	7.93	-25.95	20.48	12.12	40.81
	Centr.-planned ecs.	-83.37	-49.98	-80.83	46.87	23.83	90.89	-85.11	-30.09

Table A10 continued

SITC	Destination country(b)	1962	1967	1968	1973	1974	1978	1979	1981
61	Leather products								
	World	79.33	91.39	84.07	82.40	75.30	78.08	80.24	69.62
	Developed ecs.	77.08	91.10	85.14	94.43	93.20	98.32	98.10	83.26
	Developing ecs.	0.00	0.46	-2.36	-50.04	-59.08	-57.72	-54.25	-45.70
	- ALADI	0.00	0.00	0.00	-78.79	-83.78	-92.90	-89.92	-83.28
	- NICs	0.00	0.00	0.00	-71.29	-66.30	-62.19	-61.66	-79.46
	Centr.-planned ecs.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
62	Rubber products								
	World	-50.32	-40.97	-63.49	-52.97	-63.48	4.24	17.00	13.63
	Developed ecs.	-100.00	-100.00	-100.00	-83.50	-77.28	-41.35	-36.86	-39.56
	Developing ecs.	100.00	100.00	100.00	39.92	-16.09	67.63	72.59	59.08
	- ALADI	100.00	100.00	100.00	33.66	18.90	57.94	55.16	48.34
	- NICs	100.00	100.00	100.00	-0.98	-82.62	100.00	96.44	88.80
	Centr.-planned ecs.	0.00	0.00	0.00	100.00	-100.00	0.00	41.85	57.55
63	Wood products								
	World	70.79	90.04	88.00	94.15	84.58	82.59	842.8	84.05
	Developed ecs.	65.87	89.33	87.69	85.41	87.94	93.23	95.48	94.98
	Developing ecs.	100.00	100.00	100.00	67.47	54.17	38.60	45.97	63.69
	- ALADI	100.00	100.00	100.00	63.64	41.95	20.46	38.03	39.98
	- NICs	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Centr.-planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
64	Paper, cardboard								
	World	-100.00	-98.71	-100.00	-58.77	-73.52	-29.19	-21.20	7.51
	Developed ecs.	-100.00	-100.00	-100.00	-74.18	-82.13	-56.89	-54.77	-65.49
	Developing ecs.	-100.00	-86.94	-100.00	-15.84	-36.22	48.44	55.47	84.48
	- ALADI	-100.00	-87.58	-100.00	-23.99	-63.37	-4.70	19.00	66.74
	- NICs	0.00	0.00	0.00	10.38	-59.50	87.62	93.88	98.49
	Centr.-planned ecs.	0.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	0.00
65	Textiles								
	World	4.72	46.72	-11.35	53.23	37.20	66.52	78.55	79.81
	Developed ecs.	-34.80	23.60	-47.38	45.05	27.01	57.31	73.84	71.20
	Developing ecs.	100.00	93.36	47.09	70.40	68.17	81.57	83.42	90.83
	- ALADI	100.00	100.00	98.86	57.73	57.18	70.56	83.08	85.42
	- NICs	0.00	100.00	100.00	30.14	24.01	88.62	92.42	91.58
	Centr.-planned ecs.	-100.00	-100.00	-100.00	94.45	95.99	100.00	100.00	100.00
66	Non-metal minerals, n.e.s.								
	World	-86.69	-24.50	-38.94	-2.69	-27.96	-0.25	-1.70	9.51
	Developed ecs.	-86.66	-45.85	-62.80	-15.06	-47.72	-17.04	-29.53	-26.04
	Developing ecs.	-100.00	23.18	6.42	37.87	39.61	23.93	41.71	77.49
	- ALADI	-100.00	21.37	4.18	18.46	27.70	18.06	36.87	73.07
	- NICs	0.00	100.00	100.00	46.12	53.23	-19.84	24.91	45.54
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	65.68	53.04	59.11
69	Metal manufactures								
	World	-99.47	-87.71	-85.99	-69.00	-67.60	-8.49	-8.34	-2.52
	Developed ecs.	-100.00	-96.71	-95.47	-86.66	-85.87	-56.97	-61.21	-67.79
	Developing ecs.	2.13	25.49	6.94	33.47	35.82	81.59	81.13	85.02
	- ALADI	0.00	23.48	11.93	31.92	37.80	83.00	79.46	83.59
	- NICs	0.00	7.65	-28.50	-70.39	-58.55	23.79	45.67	79.12
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-591.6	13.07	13.08
7	Machinery and transport equipment								
	World	-95.37	-83.18	-88.27	-77.06	-68.24	-33.66	-26.74	-2.56
	Developed ecs.	-98.53	-93.29	-96.57	-89.58	-84.39	-65.30	-61.18	-49.75
	Developing ecs.	85.08	56.87	35.57	43.91	53.49	74.16	72.07	90.36
	- ALADI	87.31	59.39	49.95	46.35	55.09	65.31	72.90	89.20
	- NICs	-100.00	35.06	25.65	-23.72	-9.44	23.01	6.84	63.26
	Centr.-planned ecs.	-96.64	-100.00	-100.00	-99.48	-98.70	-97.31	-95.25	-96.32
71	Machinery, non-electric								
	World	-98.18	-79.52	-84.12	-83.03	-76.21	-43.66	-39.06	-17.62
	Developed ecs.	-99.81	-92.59	-95.56	-92.80	-89.47	-68.49	-65.15	-55.77
	Developing ecs.	100.00	67.26	56.24	33.07	48.88	72.32	77.52	90.90
	- ALADI	100.00	68.24	54.97	31.62	46.78	67.54	75.25	90.14
	- NICs	0.00	35.33	22.54	-29.35	-15.31	28.59	38.07	65.59
	Centr.-planned ecs.	-95.38	-100.00	-100.00	-100.00	-99.15	-96.24	-93.55	-97.71
72	Electrical machinery								
	World	-98.88	-89.88	-91.25	-73.77	-63.27	-52.36	-54.91	-39.63
	Developed ecs.	-100.00	-99.37	-99.37	-81.41	-72.00	-62.98	-71.50	-66.67
	Developing ecs.	3.56	24.54	-10.91	-79.22	12.40	19.76	37.53	70.29
	- ALADI	-45.93	35.22	37.61	32.39	32.42	23.50	43.07	77.88
	- NICs	-39.27	33.65	34.29	-22.38	-14.62	-26.22	16.22	57.35
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-95.87	-100.00	-100.00	-94.81

Table A10 continued

SITC	Destination country(b)	1962	1967	1968	1973	1974	1978	1979	1981
73	Transport equipment								
	World	-87.62	-85.69	-95.38	-60.30	-47.67	7.51	36.23	52.95
	Developed ecs.	-95.23	-89.83	-96.43	-90.64	-85.53	-59.06	-19.85	-5.93
	Developing ecs.	100.00	62.07	52.85	92.30	92.00	92.99	78.65	95.37
	- ALADI	100.00	45.83	37.47	90.06	89.87	86.35	85.21	92.55
	- NICs	100.00	0.00	100.00	18.95	52.65	43.45	-48.18	63.41
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-67.66
8	Misc. manufactures								
	World	-94.79	-87.30	-89.76	-14.91	-11.10	9.59	8.70	36.36
	Developed ecs.	-97.94	-93.08	-93.46	-20.66	-20.25	6.82	3.80	27.35
	Developing ecs.	-8.86	-30.60	-95.53	15.81	32.64	23.28	28.58	62.94
	- ALADI	-32.18	-33.35	-27.80	45.90	58.40	32.79	33.09	-35.59
	- NICs	-45.50	-68.44	-65.02	-77.81	-37.76	-33.40	11.31	47.88
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-85.44	-89.64	-42.60	-66.07	-35.38
81	Plumbing, heating, lighting equipment								
	World	0.00	3.01	-36.86	-23.72	6.66	68.76	81.99	87.57
	Developed ecs.	n.a.	-100.00	-100.00	-64.63	-25.52	37.41	31.80	11.97
	Developing ecs.	n.a.	100.00	8.78	31.76	57.13	83.23	94.38	98.68
	- ALADI	n.a.	0.00	0.00	100.00	84.96	85.10	100.00	100.00
	- NICs	n.a.	0.00	0.00	-100.00	-100.00	100.00	100.00	100.00
	Centr.-planned ecs.	n.a.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	Furniture								
	World	0.00	44.35	51.89	87.94	74.58	69.45	72.30	86.79
	Developed ecs.	n.a.	28.87	60.74	87.41	72.17	60.97	57.77	95.67
	Developing ecs.	n.a.	0.00	0.00	100.00	90.59	82.85	89.91	97.47
	- ALADI	n.a.	0.00	0.00	100.00	100.00	78.40	90.11	97.57
	- NICs	n.a.	0.00	0.00	0.00	0.00	-100.00	38.02	100.00
	Centr.-planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
83	Travel goods								
	World	0.00	0.00	-100.00	73.93	78.13	80.64	82.15	93.15
	Developed ecs.	n.a.	n.a.	-100.00	79.84	83.96	81.83	86.31	95.48
	Developing ecs.	n.a.	n.a.	-100.00	6.33	-21.81	66.28	43.63	60.22
	- ALADI	n.a.	n.a.	0.00	100.00	100.00	100.00	100.00	100.00
	- NICs	n.a.	n.a.	0.00	-100.00	-100.00	0.00	-100.00	-2.22
	Centr.-planned ecs.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	Clothing								
	World	100.00	0.64	-68.75	82.33	87.89	92.30	87.49	91.30
	Developed ecs.	0.00	-37.70	-66.32	82.45	86.52	90.84	85.18	89.82
	Developing ecs.	100.00	36.48	-71.41	82.01	89.70	95.40	93.20	93.09
	- ALADI	0.00	100.00	100.00	92.19	94.17	98.40	98.01	97.98
	- NICs	0.00	0.00	0.00	-100.00	27.54	14.9	90.55	82.15
	Centr.-planned ecs.	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00
85	Footwear								
	World	100.00	100.00	57.35	99.37	99.46	99.54	99.36	99.28
	Developed ecs.	100.00	100.00	0.00	99.51	99.61	99.67	99.65	99.49
	Developing ecs.	0.00	0.00	0.00	100.00	100.00	93.63	86.37	96.89
	- ALADI	0.00	0.00	0.00	100.00	100.00	93.96	86.99	96.98
	- NICs	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00
	Centr.-planned ecs.	0.00	0.00	-100.00	0.00	0.00	100.00	0.00	100.00
86	Instruments,watches,clocks								
	World	-98.69	-97.97	-98.41	-93.62	-91.68	-76.94	-69.62	-44.55
	Developed ecs.	-100.00	-100.00	-100.00	-97.91	-97.12	-92.38	-91.81	-84.83
	Developing ecs.	100.00	-44.41	-76.52	-60.53	-48.24	-29.55	-13.45	27.13
	- ALADI	0.00	-52.26	-44.12	-19.74	-13.32	-18.46	-15.94	32.56
	- NICs	0.00	-100.00	-100.00	-89.82	-85.93	-57.16	-30.92	5.73
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
89	Printed matter								
	World	-97.40	-79.03	-83.17	-46.49	-36.40	-26.75	-20.87	8.44
	Developed ecs.	-100.00	-87.79	-89.80	-60.41	-49.24	-45.47	-52.58	-36.54
	Developing ecs.	-100.00	-39.20	-57.35	-1.21	10.81	38.37	52.47	80.08
	- ALADI	-100.00	-49.39	-38.55	34.26	52.58	45.05	61.12	84.40
	- NICs	-100.00	-63.76	-55.71	-64.47	-7.22	10.27	38.73	73.96
	Centr.-planned ecs.	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00	42.97	-13.44

(a) For the formula applied to calculate RCAs, see Ch. IV.1. - (b) Classification of countries according to UNCTAD [1984]. NICs include: Argentina, Hong Kong, South Korea, Singapore, Taiwan.

Source: UN [a]; UNCTAD [various issues]; own calculations.

Table A11 - A Comparison of the Traditional Concept of Revealed Comparative Advantage and Bowen's Index for Manufacturing Industries and Various Markets in Brazil, 1964-1980 (a)

Year	Total number of sectors	Bowen index (b) (no. of sectors)		Revealed comparative advantage (c) (no. of sectors)				Revealed comparative disadvantage (c) (no. of sectors)			
		with advantage	with disadvantage	world	US	other developed countries	ALADI	world	US	other developed countries	ALADI
1964	12	5(13.0)	7(12.0)	3(3) [100]	0	0	10(4) [40]	9(7) [78]	10(7) [70]	12(7) [58]	1(0) [0]
1967	16	8(13.1)	8(20.8)	4(2) [50]	0	0	9 (5) [56]	12(6) [50]	13(6) [46]	15(8) [53]	2(0) [0]
1970	24	14(17.9)	10(10.1)	4(2) [50]	3(1) [33]	3(2) [67]	12(7) [58]	20(9) [45]	19(8) [42]	21(9) [43]	6(2) [33]
1973	55	30(29.4)	25(26.5)	16(12) [75]	15(12) [80]	15(11) [73]	26(18) [69]	39(21) [54]	36(22) [61]	40(21) [53]	22(12) [55]
1976	69	49(40.0)	20(14.5)	26(22) [85]	20(17) [85]	20(16) [80]	44(34) [77]	43(17) [40]	41(15) [36]	47(15) [32]	21(7) [33]
1978	72	50(46.9)	22(13.3)	38(28) [74]	27(20) [74]	28(18) [64]	51(36) [71]	34(12) [35]	39(13) [33]	44(12) [27]	20(7) [35]
1980	48	32(28.6)	16(9.9)	25(17) [68]	13(11) [85]	16(12) [75]	39(28) [72]	23(8) [35]	30(11) [37]	32(12) [38]	8(4) [50]

(a) In 1976, for example, the Bowen index indicates comparative advantage for 49 Brazilian industries, whereas 26 sectors had a comparative advantage according to the RCA concept (in case of trade with the world); 22 sectors out of these 26 sectors are also classified as sectors having a comparative advantage according to Bowen, i.e., a coincidence of 85 percent between both indices. - (b) The disaggregation was done at the 4-digit SITC-level. Figures in parentheses beneath Bowen's index represent exports of those sectors as a percentage of total manufactured exports. - (c) Figures in parentheses represent the number of sectors which coincide between both indices. Figures in square brackets indicate the degree of coincidence in per cent.

Source: UN [a]; own calculations.

Table A12 – Value Added per Employee in Industries in Brazil and Various Country Groups (a), 1980 (b) (US $ thousand)

ISIC	Industry	Brazil	Developed market economies	Middle income developing countries	High income developing countries	ALADI
311/2	Food products	13.4	30.2	9.8	13.1	13.9
321	Textiles	11.6	18.7	7.2	10.6	10.9
322	Apparel	7.9	14.3	4.8	8.1	7.4
323	Leather products	11.5	18.1	7.3	10.8	10.4
324	Footwear	6.8	16.4	6.5	7.9	7.3
331	Wood products	8.8	20.3	7.2	8.2	9.6
332	Furniture	10.1	18.1	5.3	9.1	8.5
341	Paper products	17.8	29.6	11.6	17.7	21.0
342	Printing, publishing	14.4	25.8	9.3	13.2	13.9
352	Other chemicals	25.6	36.9	18.8	21.3	22.9
355	Rubber products	18.4	24.1	11.3	14.6	17.9
356	Plastic products	14.2	23.4	9.0	12.9	12.9
382	Non-electr. machinery	12.5	25.4	8.3	13.7	13.8
383	Electrical machinery	18.1	24.9	9.6	14.0	15.9
384	Transport equipment	16.3	23.9	9.3	17.6	19.2
Total industries (c)		13.8	23.3	9.0	12.9	13.7

(a) Unweighted averages for all countries included in a specific country group. Country groups defined as in the source. - (b) In several cases, data is for 1979 or 1981. - (c) Unweighted averages for all industries listed.

Source: UNIDO [1984]; own calculations.

Table A13 - Wages and Non-Wage Value Added per Employee in Industries in Brazil and Various Country Groups (a), 1980 (b) (US $ thousand)

ISIC(c) industry	Brazil	Developed market economies	Middle income developing countries	High income developing countries	ALADI
311/2 Food products	2.0 (11.4)	17.7 (10.6)	2.7 (7.1)	4.7 (8.4)	3.8 (9.7)
321 Textiles	2.3 (9.3)	9.7 (8.6)	2.7 (4.5)	4.7 (5.9)	3.7 (7.0)
322 Apparel	1.7 (6.2)	7.9 (6.1)	2.0 (2.8)	3.6 (4.4)	2.7 (4.5)
323 Leather products	2.4 (9.1)	14.3 (3.7)	2.4 (4.8)	4.5 (6.1)	3.0 (7.1)
324 Footwear	1.8 (5.0)	8.4 (8.8)	2.6 (3.9)	3.7 (4.0)	2.7 (4.6)
331 Wood products	1.9 (6.9)	9.8 (10.3)	2.3 (4.8)	4.0 (4.4)	3.2 (6.2)
332 Furniture	2.7 (7.4)	9.3 (7.6)	2.2 (3.0)	3.9 (5.1)	2.9 (5.3)
341 Paper products	3.0 (14.8)	13.1 (16.0)	3.5 (7.9)	5.7 (11.8)	4.8 (15.8)
342 Printing, publishing	4.1 (10.3)	13.2 (12.6)	3.6 (5.6)	6.1 (7.3)	4.8 (9.0)
352 Other chemicals	4.6 (21.0)	13.4 (24.2)	3.7 (14.7)	6.8 (14.7)	6.2 (16.4)
356 Plastic products	2.3 (11.9)	10.9 (12.3)	2.7 (6.4)	5.0 (7.8)	3.7 (9.1)
382 Non-electr. machinery	3.8 (8.7)	13.5 (11.3)	3.7 (4.4)	5.9 (7.8)	5.0 (8.7)
383 Electrical machinery	3.6 (14.5)	13.0 (11.9)	3.2 (6.3)	5.5 (8.4)	4.6 (11.1)
384 Transport equipment	3.6 (12.7)	13.9 (9.5)	3.5 (5.5)	7.1 (10.7)	5.3 (13.9)
Total industries (d)	2.8 (10.7)	12.0 (11.0)	2.9 (5.8)	5.1 (7.6)	4.1 (9.2)

(a) Unweighted averages for all countries included in a specific country group. Country groups defined as in the source. - (b) In several cases, data is for 1979 or 1981. - (c) A differentiation of value added per employee into wage and non-wage components is not available for rubber products. - (d) Unweighted averages for all industries listed.

Source: UNIDO [1984]; own calculations.

Table A14 - Spearman and Pearson Coefficients for Correlations between Factor Intensities in Brazilian Industries (a) and Brazil's Export Pattern (b), 1967-1981

Export pattern in different markets and periods	Value added per employee		Wages per employee		Non-wage value added per employee	
	Spearman	Pearson	Spearman	Pearson	Spearman	Pearson
World						
1967	-0.02	n.c.	-0.24	n.c.	-0.15	n.c.
1973	-0.62**	-0.41	-0.59**	-0.33	-0.58**	-0.29
1981	-0.11	n.c.	-0.12	n.c.	0.11	n.c.
Δ1967-1973(d)	-0.21	n.c.	-0.25	n.c.	-0.15	n.c.
	(-0.37)	(-0.50)*	(-0.36)	(n.c.)	(-0.32)	(n.c.)
Δ1973-1981(d)	0.60**	0.42	0.54*	0.31	0.55*	0.31
	(0.62)**	(n.c.)	(0.44)	(n.c.)	(0.58)**	(n.c.)
Developed market economies						
1967	-0.45*	-0.30	-0.11	n.c.	-0.34	n.c.
1973	-0.65**	n.c.	-0.55*	-0.42	-0.57*	-0.41
1981	-0.39	-0.51*	-0.58*	-0.39	-0.43	n.c.
Δ1967-1973	-0.24	n.c.	-0.23	n.c.	-0.17	n.c.
Δ1973-1981	0.21	n.c.	0.14	n.c.	0.12	n.c.
Developing countries						
1967	0.50*	0.07	0.07	n.c.	0.38	n.c.
1973	0.37	n.c.	0.03	n.c.	0.35	n.c.
1981	0.60**	n.c.	0.17	n.c.	0.63**	n.c.
Δ1967-1973	-0.04	n.c.	0.10	n.c.	0.14	n.c.
Δ1973-1981	0.14	n.c.	0.07	n.c.	0.25	n.c.
ALADI						
1967	0.52*	0.11	0.10	n.c.	0.40	n.c.
1973	0.35	n.c.	0.00	n.c.	0.32	n.c.
1981	0.53*	n.c.	0.08	n.c.	0.53*	n.c.
Δ1967-1973	0.07	n.c.	0.20	n.c.	0.30	n.c.
Δ1973-1981	0.08	n.c.	0.03	n.c.	0.16	n.c.

(a) Without machinery and transport equipment. - (b) Correlations are run between factor intensities as reported in Table 10 and export shares of the respective industries in total Brazilian manufactured exports to various markets as reported in Nunnenkamp, Fasano-Filho [1986, Table A6]. "Δ" denotes the change in export shares in percentage points. Pearson coefficients are given only if correlation results differ between both procedures, i.e., Spearman rank correlations being statistically significant and Pearson correlations remaining insignificant, and vice versa. - ** ≙ significant at the 5 per cent level; - * ≙ significant at the 10 per cent level. - (c) n.c. = not calculated. - (d) Change in export shares in per cent in parentheses.

Source: Table 10 and Nunnenkamp, Fasano-Filho [1986, Table A6]; own calculations.

Table A15 - Evolution of Revealed Comparative (Dis)Advantage of Brazilian Manufactured Exports Classified by
Export Market at 2-Digit SITC Level, 1962-1981 (number of sectors)(a)

Year	Markets with a revealed comparative advantage					Markets with a revealed comparative disadvantage				
	world	developed ecs.	develo-ping ecs.	ALADI	centr.-planned ecs.	world	developed ecs.	develo-ping ecs.	ALADI	centr.-planned ecs.
1962	5 (18.6)	3 (16.9)	10 (80.0)	5 (67.7)	7 (74.2)	16 (77.4)	17 (78.4)	8 (11.6)	9 (6.2)	6 (2.5)
1967	9 (29.3)	5 (31.7)	15 (83.0)	14 (83.0)	9 (88.4)	15 (70.8)	18 (67.9)	7 (16.7)	6 (7.4)	4 (7.9)
1968	5 (17.3)	3 (30.9)	13 (76.2)	12 (88.3)	9 (89.5)	20 (82.6)	21 (68.1)	10 (22.5)	8 (5.4)	6 (8.8)
1973	8 (48.6)	7 (61.2)	18 (79.2)	18 (92.7)	7 (45.0)	17 (51.4)	18 (38.8)	8 (20.8)	6 (7.2)	15 (53.4)
1974	9 (38.0)	7 (48.7)	15 (87.3)	18 (88.3)	7 (41.3)	16 (62.0)	18 (51.3)	10 (12.7)	8 (11.7)	14 (57.9)
1978	11 (50.2)	9 (43.2)	18 (93.7)	19 (92.3)	16 (79.4)	14 (49.8)	18 (56.8)	6 (6.3)	6 (7.7)	8 (20.1)
1979	12 (51.5)	9 (44.6)	20 (93.6)	20 (92.6)	18 (80.6)	13 (48.5)	16 (55.4)	5 (6.4)	5 (7.4)	7 (19.2)
1981	15 (55.1)	10 (34.3)	22 (96.7)	22 (96.5)	22 (99.2)	10 (44.9)	15 (62.6)	3 (3.3)	3 (3.5)	3 (0.8)

(a) Numbers in parentheses represent the total exports of those sectors as a percentage of total manufactured
exports to the region.

Source: Table A9.

Table A16 – Different Measures of the Real Exchange Rate (a) in Brazil, 1963-1984

Year	E_1 (1975= 100)	ΔE_1 (per cent	E_2 (1975= 100)	ΔE_2 (per cent)	E_3 (1975= 100)	ΔE_3 (per cent)	Cardoso's indices		Dippl's index
							$\hat{=} E_2$	$\hat{=} E_3$	
1963	80.00	n.a.	84.38	n.a.	82.81	n.a.	90.5	94.7	n.a.
1964	116.92	46.15	113.11	34.04	109.57	32.31	107.8	109.2	n.a.
1965	111.66	-4.50	100.23	-11.39	112.45	2.63	107.4	109.6	117.4
1966	86.54	-22.50	84.92	-15.27	86.18	-23.36	93.8	97.2	102.4
1967	91.61	5.86	64.14	-24.47	93.12	8.05	87.7	93.3	100.6
1968	98.82	7.87	71.23	11.06	101.95	9.48	90.6	98.2	100.4
1969	102.11	3.33	72.50	1.78	101.31	-0.63	93.5	101.9	105.9
1970	95.65	-6.33	92.80	28.08	92.83	-8.37	90.6	97.3	100.6
1971	98.88	3.37	97.09	4.56	96.48	3.93	92.3	96.5	102.2
1972	100.36	1.50	95.63	-1.51	95.93	-0.57	93.9	95.4	102.8
1973	103.20	2.83	101.10	5.73	97.11	1.23	98.1	95.4	95.8
1974	99.21	-3.87	96.94	-4.11	99.11	2.06	100.6	97.3	96.4
1975	100.00	0.80	100.00	3.16	100.00	0.90	100.0	100.0	100.0
1976	91.44	-8.56	99.95	-0.07	93.09	-6.91	96.6	95.9	93.3
1977	99.66	8.99	98.42	-1.52	96.00	3.13	96.1	94.6	95.7
1978	103.99	4.35	104.94	6.62	97.36	1.42	102.8	94.7	99.5
1979	104.85	0.82	119.24	13.63	101.05	3.79	114.4	101.8	110.7
1980	103.74	-1.05	115.10	-3.47	108.91	7.78	124.4	110.2	122.5
1981	79.22	-23.63	90.74	-21.16	89.94	-17.42	n.a.	n.a.	108.2
1982	93.51	18.03	89.71	-1.15	99.56	10.70	n.a.	n.a.	107.3
1983	113.37	21.25	112.88	25.84	117.97	18.49	n.a.	n.a.	126.5
1984	89.95	-20.66	87.34	-22.62	94.80	-19.64	n.a.	n.a.	n.a.

(a) Above 100 = real depreciation; below 100 = real appreciation. The definition of E_1, E_2 and E_3 is as follows:

- $E_1 = E_1^{nom} / (WP^B / WP_1^*)$; where E_1^{nom}: moving weighted average of nominal exchange rate indices between Brazil and nine countries (US, Argentina, Mexico, South Korea, Federal Republic of Germany, United Kingdom, Italy, the Netherlands and Japan) which are considered the main competitors of Brazil (country weights according to their share in world manu-factured exports; these partial multilateral trade weights are usually used to capture export competition in third markets; see Gutierrez-Camara, Huß [1983]; WP^B: Brazilian wholesale price index; WP_1^*: moving average of wholesale price indices of the nine aforementioned countries.

- $E_2 = E_2^{nom} / (WP^B / WP_2^*)$; where E_2^{nom}: moving weighted average of nominal exchange rate indices between Brazil and twelve countries (US, Argentina, Colombia, Mexico, Paraguay, Chile, Federal Republic of Germany, United Kingdom, Italy, the Netherlands, Japan and Vene-zuela), which stand for Brazil's major trading partners in manufactures (country weights according to their share in total Brazilian manufactured exports); WP_2^*: moving weighted average of wholesale price indices of the twelve aforementioned countries.

- $E_3 = E_3^{nom} / (WP^B / WP^{US})$; where E_3^{nom}: nominal exchange rate index between the Brazil-ian Cruzeiro and the US dollar; WP^{US}: US wholesale price index.

Source: IMF [b]; Banco Central do Brasil [various issues]; Cardoso [1982, Table 6.A]; Dippl [1986, Table 7, p. 17, column 5]; own calculations.

Table A17 – Profitability of Exports vis-à-vis the Domestic Market (a) in Brazil, 1962-1984

Year	P_x^{iB}	E	WP^B	(1+s) (b)	PRS	ΔPRS (per cent)	PRS	$\frac{(P_x^{iB} \cdot E)}{WP^B}$	Cardoso (c)	Horta (d)	Dippl (e)
1962	31.6	4.2	2.3	1.000	57.70	n.a.	38.7	57.70	n.a.	n.a.	n.a.
1963	35.6	6.4	4.1	1.000	55.57	-3.69	37.3	55.57	63.5	n.a.	n.a.
1964	39.2	13.7	7.8	1.004	69.13	24.40	46.4	68.50	73.6	n.a.	n.a.
1965	35.2	23.3	11.7	1.050	73.60	6.47	49.4	70.10	77.3	n.a.	75.9
1966	36.7	27.3	16.0	1.050	65.75	-10.67	44.1	62.62	68.5	n.a.	66.2
1967	35.9	32.8	20.1	1.216	71.24	8.35	47.8	58.58	76.3	n.a.	75.3
1968	37.1	41.6	24.9	1.265	78.41	10.06	52.6	61.98	83.4	n.a.	78.1
1969	38.8	50.1	29.9	1.316	85.56	9.12	57.4	65.01	90.0	n.a.	87.4
1970	41.0	56.5	36.6	1.389	87.91	2.75	59.0	63.29	89.4	n.a.	89.2
1971	45.5	65.1	43.9	1.413	95.35	8.46	64.0	67.47	91.6	59.8	92.9
1972	50.8	73.0	52.1	1.421	101.14	6.07	67.8	71.18	91.2	65.0	94.1
1973	71.7	75.4	60.9	1.434	127.30	25.87	85.4	88.77	91.8	83.5	88.8
1974	100.8	83.5	78.6	1.470	157.41	23.65	105.6	107.08	96.0	102.0	90.5
1975	100.0	100.0	100.0	1.491	149.10	-5.28	100.0	100.00	100.0	100.0	100.0
1976	95.5	131.3	143.4	1.506	131.69	-11.68	88.3	87.44	96.1	98.3	100.1
1977	107.0	174.0	204.2	1.500	136.76	3.85	91.7	91.18	95.6	103.4	100.7
1978	107.0	222.3	280.9	1.513	128.12	-6.32	85.9	84.68	95.8	98.3	106.4
1979	119.8	319.8	437.1	1.460	127.97	-0.12	85.8	87.65	102.8	101.4	113.4
1980	130.7	648.4	903.1	1.387	130.15	1.70	87.3	93.84	74.0	101.7	119.7
1981	128.6	1145.5	1880.2	1.459	114.31	-12.17	76.7	78.35	n.a.	88.1	111.2
1982	116.8	2208.3	3610.4	1.535	109.66	-4.07	73.5	71.44	n.a.	n.a.	n.a.
1983	108.5	7098.5	9685.3	1.615	128.43	17.12	86.1	79.52	n.a.	n.a.	n.a.
1984	113.2	22734.0	32557.8	1.699	134.30	4.57	90.1	79.04	n.a.	n.a.	n.a.

(a) The definition of variables is as follows: $PRS = P_x^{iB} \cdot E(1+s)/WP^B$, where PRS: profitability of exports vis-à-vis the domestic market; P_x^{iB}: Brazilian manufactured export price index in US dollars (see FGV); E: (nominal) exchange rate index between the Brazilian cruzeiro and the US dollar; WP^B: Brazilian wholesale price index; s: export subsidies. – (b) From 1982 until 1984, an annual increase in subsidies of 5.2 per cent was assumed, which was equal to the increase from 1980 to 1981. Subsidy rates were taken from Cardoso and Horta. – (c) Real US dollar exchange rate for exporters (D.W.) was calculated by Cardoso as follows: $D.W. = (P_{US} \cdot Ix)/P$ where Ix is the rate of cruzeiros received for one US dollar of exported goods (including subsidies). – (d) Horta: index recalculated with base 1975=100. – (e) Dippl: index recalculated with base 1975=100. Dippl used a trade-weighted real exchange rate.

Source: IMF [a]; FGV [various issues]; Cardoso [1980; 1982]; Horta [1983, Table 10, p. 532]; Dippl [1986, Table 7, column 6]; own calculations.

Table A18 – The Relationship between Policy Incentives and Factor Intensities in Brazilian Industries: Rank Correlation Results, 1980 (a)

Incentive rates (b)	Value added		Wages		Non-wage value added	
	per employee					
Fiscal export incentives	0.18	(0.29)	0.04	(0.45)	0.25	(0.23)
Financial export incentives	−0.54	(0.04)	−0.30	(0.19)	−0.48	(0.07)
Total export incentives	−0.01	(0.49)	−0.10	(0.38)	0.12	(0.37)
Implicit nominal protection	−0.28	(0.19)	0.02	(0.47)	−0.24	(0.24)
Adjusted anti-export bias	−0.27	(0.20)	0.14	(0.34)	−0.27	(0.21)
Adjusted effective incentives to domestic sales	−0.33	(0.15)	0.13	(0.35)	−0.32	(0.17)

(a) Level of significance of Spearman correlation coefficients in parentheses; number of observations: 12 in the case of value added per employee, 11 in the case of wages and non-wage value added per employee. – (b) For the definition of incentive rates, see Table 15.

Source: Tables 11 and 15; own calculations.

Table A19 - Relative Importance of Different Types of Firms in Industrial
Sectors of Brazil, 1972 (per cent)(a)

| Industry | Public firms | Type of private firms | |
		national	multinational
Non-metallic mineral products	0	40.2	59.7
Metallurgy	52.5	21.0	26.5
Mechanical equipment	0	25.4	74.6
Electrical and communication material	0	23.8	76.2
Transport equipment	0	3.6	96.4
Wood products	0	82.4	17.6
Paper products	0	63.0	37.0
Furniture	0	100.0	0
Leather products	0	n.a.	n.a.
Chemicals	13.3	35.6	51.1
Plastics	0	30.0	70.0
Pharmaceuticals	0	7.0	93.0
Perfumery, soap	0	96.7	3.3
Textiles	0	62.1	37.9
Clothing and footwear	0	50.1	49.7
Printed matter	0	99.0	1.0
Food	0	46.2	53.8
Beverages	0	85.4	14.7
Tobacco	0	0.1	99.9
Total	20.7	24.0	55.3

(a) Classification according to total sales (faturamento).

Source: von Doellinger, Cavalcanti [1975, Table III.8, p. 39].

Table A20 - Participation of Foreign-Owned Firms (a) in Total Employment, Value Added, Domestic Sales, Exports and Export Subsidies in Brazil's Manufacturing Industry, 1978 (per cent)

Industry	Employ-ment	Value added	Domestic sales	Export sales	Export subsidies	
					export credit	income tax exemption
Non-metallic minerals	22.4	29.2	28.4	32.3	41.1	40.4
Basic iron and steel	26.4	37.1	34.9	18.7	21.3	17.8
Basic non-ferrous metals	18.2	24.1	22.4	38.2	51.1	23.7
Metal products	19.1	30.8	25.4	43.7	34.8	37.6
Machinery	34.8	47.1	43.5	59.5	52.1	44.8
Electrical equipment	54.7	66.5	62.4	80.0	81.4	58.6
Transport equipment	53.7	60.0	69.0	67.2	75.2	48.2
Wood products	5.9	5.3	3.3	14.8	18.1	9.0
Furniture	4.9	6.3	5.3	3.1	3.4	4.5
Paper products	14.6	21.4	19.1	22.7	23.2	32.2
Rubber products	45.1	67.8	70.7	83.0	84.4	88.3
Leather products	9.6	13.9	11.9	21.1	17.2	4.9
Chemicals	32.0	25.1	20.3	9.2	24.3	18.4
Pharm., cosmetics	46.9	59.0	54.3	57.9	48.9	57.8
Plastics	11.9	17.8	17.9	20.0	25.9	12.2
Textiles	19.5	27.2	27.4	36.6	36.2	45.3
Clothing	3.1	5.6	5.1	6.9	10.2	0.8
Footwear	2.9	2.7	4.0	0.9	1.7	0.0
Food, beverages, tobacco	12.6	20.6	20.4	30.1	32.5	28.2
Printing	4.7	5.6	4.9	0.1	0.9	1.7
Other manufactures	27.1	39.9	34.0	24.7	36.5	47.1
Total manufacturing	26.1	35.9	33.0	38.8	47.5	33.5

(a) Defined as firms in which non-residents controlled more than 10 per cent of equity. Thus, 841 out of 12,435 sample firms were labelled foreign-owned firms.

Source: ECLA [1985, p. 21, Table 2].

Table A21 - Capital Intensity (a) of Exporting and Non-Exporting Brazilian Firms by Industry, 1978
(Cr $ thousand)

		Value added	Non-wage value added	Wages			Value added	Non-wage value added	Wages
		per employee					per employee		
Total	non-exporters	175.8	93.7	52.5	Rubber	non-exporters	158.1	81.0	45.6
	exporters	234.5	142.1	73.6	products	exporters	214.3	135.3	73.8
Non-metallic	non-exporters	165.7	87.0	52.8	Leather	non-exporters	108.6	32.9	32.9
minerals	exporters	202.0	126.0	66.9	products	exporters	162.6	46.8	46.8
Basic iron	non-exporters	195.8	67.0	71.0	Chemicals	non-exporters	403.9	244.3	95.5
and steel	exporters	249.2	145.1	79.4		exporters	457.3	298.6	108.3
Basic non-	non-exporters	216.9	128.4	63.9	Pharm.,	non-exporters	183.3	100.6	47.0
ferrous metals	exporters	285.5	185.2	90.0	cosmetics	exporters	314.9	203.4	104.0
Metal	non-exporters	184.4	99.5	59.7	Plastics	non-exporters	176.1	93.4	56.2
products	exporters	219.0	131.5	78.2		exporters	243.3	145.9	71.6
Machinery	non-exporters	261.5	122.1	85.6	Textiles	non-exporters	175.8	97.7	51.2
	exporters	286.6	161.5	105.2		exporters	198.0	128.2	57.8
Electrical	non-exporters	232.3	120.5	72.4	Clothing	non-exporters	144.5	80.1	43.7
equipment	exporters	250.4	145.2	86.7		exporters	157.9	91.1	52.1
Transport	non-exporters	196.2	102.2	71.8	Footwear	non-exporters	114.2	60.7	41.2
equipment	exporters	229.3	123.1	84.3		exporters	103.0	58.3	42.2
Wood products	non-exporters	133.8	75.5	38.4	Food, beverages,	non-exporters	176.7	90.8	46.7
	exporters	173.7	113.6	44.7	tobacco	exporters	284.9	185.0	69.2
Furniture	non-exporters	132.5	76.9	44.5	Printing	non-exporters	191.4	107.9	67.5
	exporters	175.3	114.0	55.2		exporters	290.7	174.4	107.2
Paper	non-exporters	134.2	68.3	43.6	Other	non-exporters	233.3	143.1	61.9
roducts	exporters	251.7	158.1	81.3	manufactures	exporters	246.2	150.4	71.3

(a) Value added per employee, non-wage value added per employee and wages per employee indicate overall, physical and human capital intensity, respectively. Calculated as means on the basis of data for a total number of about 12,400 sample firms; natural logarithms as presented in the source were transformed by the authors. It may be due to both factors that figures for non-wage value added per employee plus wages per employee do not add up to total value added per employee.

Source: ECLA [1985, pp. 77-78, Table C-11].

Table A22 – Comparison of Exporting and Non-Exporting Brazilian Firms as regards Electricity Consumption and Wages Paid (a): Selected Industries by Firm Size, 1974

Firm size (b)	Consumption of electricity per employee (1000 kw p.a.)			Average wage (Cr $ thousand)		
	exporters (1)	non-ex-porters (2)	differ-ence (c) (3)	exporters (4)	non-ex-porters (5)	differ-ence (d) (6)
	four manufacturing industries (e)					
Total	12.9 (1226)	6.2 (17955)	108.1	18.8	12.1	55.4
0- 100	3.8 (546)	2.7 (17098)	40.7	11.9	9.6	24.0
101- 200	4.8 (193)	4.0 (456)	20.0	13.2	11.8	11.9
201- 500	8.3 (239)	7.9 (294)	5.1	13.0	12.3	5.7
501-1000	12.1 (138)	10.0 (79)	21.0	13.4	13.1	2.3
1001-2000	10.1 (74)	16.4 (19)	-38.4	16.8	15.2	10.5
2001 and more	18.0 (36)	10.8 (9)	66.7	25.4	20.8	22.1
	transport equipment industry					
Total	8.4 (162)	4.2 (1702)	100.0	26.8	14.2	88.7
0- 100	1.9 (64)	2.0 (1586)	-5.0	12.0	10.4	15.4
101- 200	2.7 (21)	2.9 (64)	-6.9	14.8	13.7	8.0
201- 500	3.0 (36)	3.4 (39)	-11.8	16.2	15.6	3.8
501-1000	4.9 (12)	5.6 (10)	-12.5	19.6	16.9	16.0
1001-2000	4.6 (14)	4.0 (2)	15.0	24.3	20.1	20.9
2001 and more	10.0 (15)	17.4 (1)	-42.5	29.2	21.4	36.4
	textiles industry					
Total	8.9 (477)	4.7 (3798)	89.4	12.3	8.8	39.8
0- 100	3.1 (208)	3.0 (3536)	3.3	10.7	7.8	37.2
101- 200	3.5 (77)	4.3 (128)	-18.6	10.8	9.4	14.9
201- 500	5.7 (89)	5.4 (105)	5.6	10.1	9.0	12.2
501-1000	8.2 (56)	6.9 (23)	18.8	10.5	9.4	11.7
1001-2000	8.3 (38)	8.4 (6)	-1.2	10.7	10.7	0.0
2001 and more	16.0 (9)	n.a. (0)	n.a.	18.8	n.a.	n.a.

(a) Consumption of electricity per employee as an indicator of physical capital intensity; average wages paid as an indicator of human capital intensity. Number of firms in the respective category in parentheses. The way of calculating the measures for the total number of firms on the one hand and different size classes on the other is not explained in the source. Thus, it is not completely clear why figures for the totals differ considerably from both weighted and unweighted averages for the size classes. – (b) Size classes according to the number of employees. – (c) (1)-(2)/ (2) · 100. – (d) (4)-(5)/(5) · 100. – (e) Metallurgy, textiles, transport equipment and food, with a total number of 19,181 firms of which 1,226 were exporters.

Source: Silber [1983, Tables 14, 16 and the statistical appendix to Ch. 4].

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